Cushman

CE-5110 Communications Monitor

OWNER'S MANUAL

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TABLE OF CONTENTS

Section Page

1 GENERAL
Introduction and Scope....1-1
Description....1-2
Specifications....1-8

2 INSTALLATION
Introduction....2-1
Environmental Requirements....2-1
Temperature....2-1
R.F. Fields....2-1
Power Requirements....2-1
Service or Repair....2-1
Preparation for Shipment....2-1
Receiving....2-2

3 OPERATION
General....3-1
Turn-on and Warm-up....3-1
Monitor Operation....3-1
Carrier Frequency Measurements....3-1
Frequency Deviation Measurements....3-1
Modulation Measurement Using INT TONE..3-8
Signal Generator Operation....3-8
CW Mode....3-8
FM Mode....3-8
External Oscillator Operation....3-9
Transmitter Power Measurements....3-10
Spectrum Monitor Operation....3-10
General....3-10
Spectrum Monitoring....3-10
Tracking Generator Calibration....3-11
Measuring Cable Fault Distance....3-12

4 THEORY OF OPERATION
Introduction....4-1
Circuit Reference System....4-1
Operation Description....4-1
Monitor Operation....4-1
Frequency Generator....4-3
Offset Generator....4-3
Functional Description....4-3
Frequency Entry....4-3
Frequency Loops....4-3
Monitor Section....4-6
Signal Generation Section....4-6
Audio Synthesizer....4-10
Display Conversion....4-10
Power Supplies....4-10
Offset Generator....4-10

Section Page

Circuit Card Description....4-11
11000 RF Select Switch Monitoring....4-11
12000 ALC/SQUELCH/DC Control....4-11
22000 Audio Synthesizer....4-12
23000 10.7 MHz IF....4-13
24000 FM/AM Detector No. 1....4-13
25000 Bandpass Filter....4-14
26000 Log Converter....4-14
27000 YIG FM Coil Driver/Sweep Driver..4-15
28000 Loops A and B Divide-By-N....4-16
29000 Loops A and B VCO Phase Detector....4-17
30500 PCB Sweeper Relay....4-17
31000 Audio Control....4-18
32000 FM/AM Detector No. 2....4-18
32000 FM/AM Detector No. 2 (OP-04)....4-19
33000 YIG Main Coil Driver....4-19
34000 Digit Decode/Divide-By-P....4-20
35000 REF FREQ Divider/SINAD....4-20
36000 FM/AM Modulation....4-21
37000 REF FREQ Generator....4-21
38000 SSB/Zero Beat/Sweep Driver....4-22
39000 10V/5V Regulators....4-22
41000 Vertical Amplifier....4-23
42000 Time Base and Horizontal Amplifier....4-24
43000 Vertical Deflection Switch Mounting....4-25
44000 Horizontal Deflection Switch Mounting....4-25
45000 DC/DC Converter....4-25
51000 RF Attenuator....4-26
52000 1st Converter....4-26
53000 2nd Converter....4-26
61000 159.3-169.3 MHz IF....4-26
62000 210.7 MHz IF....4-27
63000 VCO and 1865 kHz Up Converter....4-27
64000 210.7 MHz BPF....4-28
65000 2.075 GHz Up Converter....4-28
66000 1865 MHz Filter and Amplifier....4-28
69000 YIG Interconnect....4-28
71000 1.7 GHz PLL....4-28
72000 10 MHz Sampler....4-29
73000 208-307 MHz VCO/Divide-By-10 Sampler....4-29
74000 3dB Power Splitter Buffer Amplifier....4-29
75000 Final Mixer and 1-1 GHz Lowpass Filter....4-29

TABLE OF CONTENTS

Section Page

Circuit Card Description (Cont'd)
76000 Directional Coupler.....4-29
81000 Output Protection/Power Detector.....4-29
82000 High Level Amplifier.....4-30
91000 AC/DC Switching Supply No. 1.....4-30
92000 AC/DC Switching Supply No. 2.....4-31
93000 Speaker Driver.....4-32
95000 Divide-By-N/Phase Detector.....4-32
96000 Down Converter.....4-33
97000 Up Converter.....4-33
98000 88-100 MHz VCO.....4-34

5 MAINTENANCE
General.....5-1
Performance Checks.....5-1
Test Equipment Required.....5-1
Signal Generator Mode.....5-1
Time Base Calibration.....5-1
Phase Lock Loop Response.....5-4
Output Signal Spur Check.....5-4
Output Level Check.....5-4
AM Modulation Check.....5-4
FM Modulation Check.....5-5
Monitor Tests.....5-6
Frequency Error Meter Calibration.....5-6
SINAD Test.....5-6
FM Sensitivity Test.....5-7
AM Sensitivity Test.....5-8
Residual FM Check.....5-8
AM Demodulation Test.....5-8
Internal Oscilloscope Test.....5-9
CRT and LED Functional Test.....5-9
DC Balance Test.....5-9
HORIZ EXT Test.....5-9
EXT Gain Test.....5-9
Trigger Level Check.....5-9
FM Modulation Balance Check.....5-9
Power Meter Check.....5-10
Meter Calibration.....5-10
Power Detector Sensitivity (Internal).....5-10
OXCO Operation Check.....5-10
SSB/BFO Check.....5-10
Spectrum Monitor Tests.....5-10
HORIZ Scale Check.....5-11
Log Scale Check.....5-11
Spurious Response Check.....5-12
Track Generator Check.....5-12
Fall and Variable Sweep Check.....5-12

Section Page

Offset Generator Check.....5-14
Tracking Scope Check.....5-15/5-16
External DC Check.....5-15/5-16
Access and Parts Location.....5-15/5-16
Troubleshooting.....5-15/5-16

6 DRAWINGS

TABLES

Table Page

1-1 CE-5110 Series Specifications.....1-2
3-1 CE-5110 Front Panel Controls, Indicators and Connectors.....3-4
5-1 Assembly Location Table.....5-3

FIGURES

Figure Page

1-1 CE-5110 Communications Monitor.....iii
2-1 CE-5110 Packaging Material.....2-3
3-1 CE-5110 Controls and Indicators.....3-2
4-1 CE-5110 Functional Block Diagram.....4-2
4-2 1.7 GHz Phase Lock Loop (PLL).....4-4
4-3 Basic Synthesizer Loop.....4-5
4-4 YIG Frequency Loops.....4-7
4-5 Monitor Section Block Diagram.....4-8
4-6 Signal Generator Section.....4-9
4-7 Power Supplies.....4-10
5-1 CE-5110 Circuit Location and Access.....5-2
5-2 CE-5110 Functional Flow Diagram.....5-17/5-18
5-3 General Troubleshooting Diagram.....5-19/5-20
5-4 Signal Generator Troubleshooting Diagram...5-21/5-22
5-5 Monitor Function Troubleshooting Diagram...5-25/5-26
5-6 Phase Lock Loop Troubleshooting Diagram....5-27/5-28
5-7 Main Casting Cable Interconnect.....5-29
5-8 Output Casting Interconnect.....5-30
5-9 Receive Casting Interconnect.....5-30

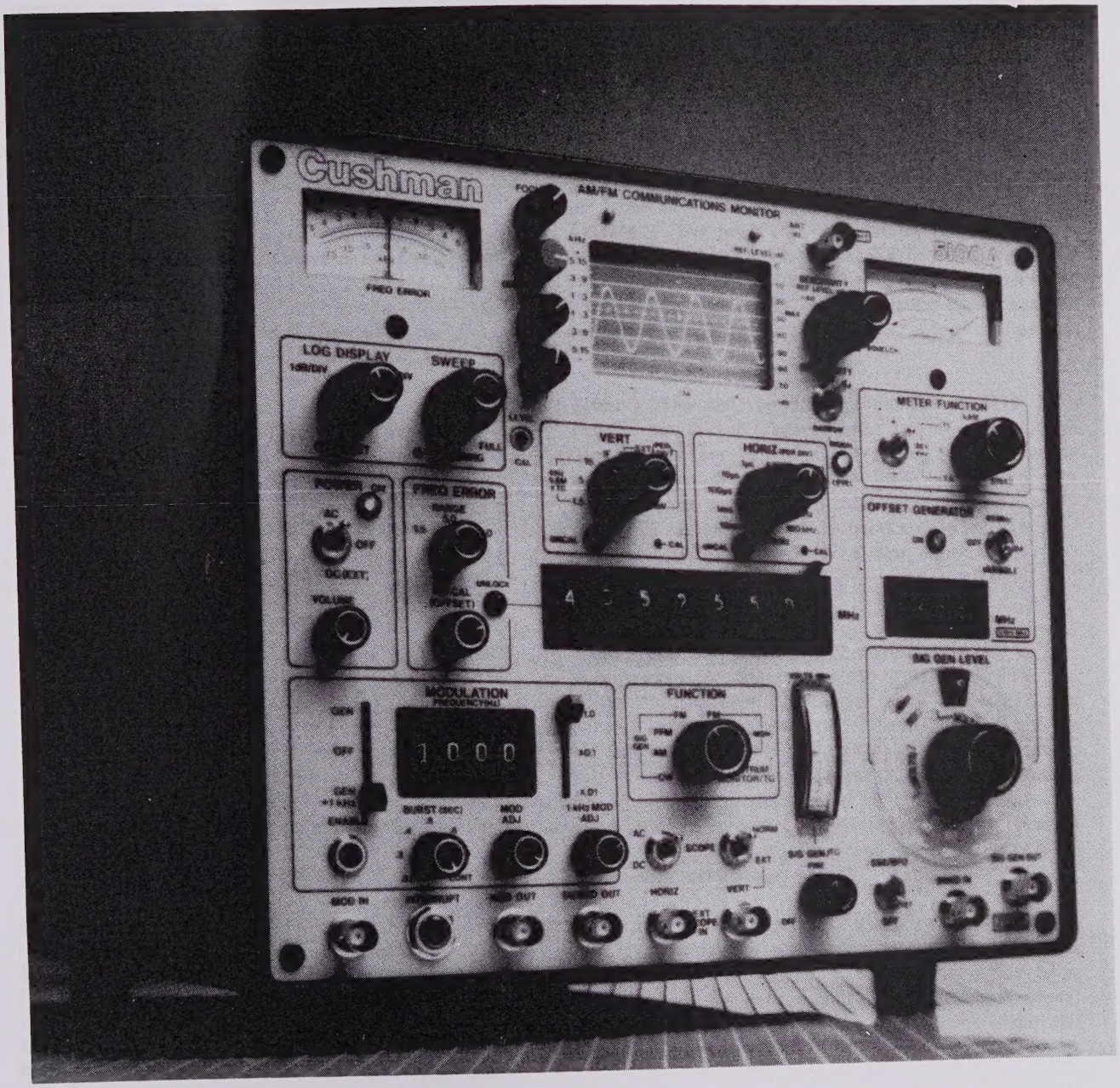


Figure 1-1. CE-5110 Communications Monitor

SECTION 1
GENERAL

INTRODUCTION AND SCOPE

1.01 This manual contains a description, theory of operation, and all the information necessary for the owner to install, operate, and repair the CE-5110 Communications Monitor pictured in Figure 1-1. Included are instructions for returning the Monitor to the factory for calibration or repair.

1.02 This manual is composed of the following six sections:

a) SECTION 1, GENERAL, contains the description and specifications of the CE-5110 Communications Montior.

b) SECTION 2, INSTALLATION, contains information needed to receive the CE-5110 Communications Monitor.

c) SECTION 3, OPERATION, contains operating instructions for the CE-5110 Communications Monitor.

d) SECTION 4, THEORY OF OPERATION, describes the function of the CE-5110 Communications Monitor in conjunction with the overall block diagram.

e) SECTION 5, MAINTENANCE, contains information needed to determine if the Model CE-5110 is operating within the range of the established instrument specifications.

f) SECTION 6, DRAWINGS.

DESCRIPTION

1.03 The Cushman CE-5110 Communication Monitor is a portable self-calibrating, test instrument used in the maintenance and repair of two-way radio systems operating up to 1000 MHz. The monitor measures the carrier frequency and modulation characteristic of transmitted signals, and tramsitted RF power.

Demodulated audio frequencies are displayed on an oscilloscope for visual/signal monitoring. Full service power supplies allow use at unpowered remote sites (by vehicle power or external battery) as well as in the shop. The Monitor combines the functions of an RF signal generator, frequency comparator, audio generator and modulator, RF power meter, FM/AM modulation deviation meter, 1 MHz oscilloscope, reflectometer cable fault locator, and SINAD meter into a single instrument.

1.04 The Monitor will also generate accurate RF signals for testing sensitivity, alignment, and performance for radio receivers, repeaters and systems. The generated RF can be transmitted as either a CW signal, or can be FM/AM modulated by a 10 Hz to 9999 Hz audio frequency tone synthesizer. A simultaneous 1 kHz + Tone modulation can be generated to help with signal tracing and system alignment.

1.05 The monitor section of the CE-5110 is a triple conversion superheterodyne receiver. The input has a four position (MAX, -40, -20, 0) sensitivity select switch and a variable squelching circuit. It can reduce the 0.5 microvolt input sensitivity to allow testing of transmitter output signals at any distance from a few feet to several miles.

1.06 The CE-5110 signal generator section is highly accurate frequency synthesizer with a frequency range of 100 kHz to 999.9999 MHz. The frequency synthesizer has a variable .1 to 12 MHz offset, and a fixed 45 MHz offset. Its output can be connected directly to a transceiver or repeater, and is protected from accidental transmitter keying by an automatic electronic circuit breaker. An output level from 0.1 microvolt to 300 millivolts rms is selectable at the Front Panel by precision attenuator switching.

1.07 To monitor signals, the CE-5110 FUNCTION switch is placed in the MON mode. This allows signals picked up at the antenna input to be processed by the unit. The 0-1000 MHz input signal to be monitored is selected on the Front Panel MHz (Frequency Select) switches.

1.08 RF power is measured by the CE-5110 in two ranges, 0-10 watts and 10-100 watts. Power is measured at the SIG GEN OUT/RF IN jack on the Front Panel. A minimum of 0.9 watts is required to activate power meter. Automatic protection circuitry prevents input power from damaging the Monitor output circuits. An advantage to this input/output circuitry is that with only two cable connections

Table 1-1. CE-5110 Series Specifications

ITEM	CHARACTERISTICS
Signal Generator	
Frequency Range	.45 to 999.9999 MHz (usable to 10 kHz).
Accuracy	
AM/CW	±.000001 ± (time base stability).
FM	±50 Hz additional.
Variable Frequency Offset	±15 kHz about dialed-in frequency with single knob control.
Level	
Range	0.1 uV to 300 mV rms.
Continuous Accuracy	±3dB.
Overall	±2dB typical for levels from 0.7 uV to 100 mV.
Modulation (AM, FM, Pulsed FM, CW)	
FM Internal	
Frequency, Accuracy	Refer to audio synthesizer specifications.
Deviation	1.5, 5, and 15 kHz peak deviation full scale ranges on meter and CRT. Accuracy ±5%.
FM External Deviation	
Sine wave	30 Hz to 10 kHz maximum deviation.
Square wave	5 Hz to 300 Hz, 3 kHz maximum deviation.
AM Internal	
Frequency, Accuracy	Refer to audio synthesizer specification.
Range	0 to 100% full-scale range on meter ±15, ±50, and ±150% full-scale range on CRT.
AM External	
Frequency	30 Hz to 10 kHz.
Pulsed FM - External only	
Frequency Range	50 Hz to 300 Hz (5 to 99% duty cycle).
Deviation	2 kHz maximum.
Spurious Outputs	
Harmonics	(Frequency ≥1 MHz) >-30 dBc (-60 dB typical).
Non-Harmonics	>35 dBc down (60 dB down typical).
Residual FM	≤100 Hz.

Table 1-1. CE-5110 Series Specifications (Cont'd)

ITEM	CHARACTERISTICS
Offset Generator	Offset signal generated simultaneously with instrument in monitor mode.
Frequency Range	10 Mhz to 999.9999 MHz. Offset from monitor receiver frequency.
Frequency Offset	±0.10 to 12.00 MHz and ±45.00 MHz about monitor receiver frequency (frequency > offset frequency).
Resolution	10 kHz
Output Level	0.1 uV to 300 mV uncalibrated.
Output Spectrum	DSB suppressed carrier (2 signals of equal level above and below monitor dialed-i frequency).
Carrier Suppression	Received frequency suppressed 20dB minimum, 30dB, typical.
Monitor	
Functions	Frequency error, FM deviation, %AM, Power, SINAD, audio frequency (Lissajou), SSB/Zero beat.
Frequency Range Resolution	 0.45 to 999.9999 MHz (usable to 50 kHz). 100 Hz.
Inputs 2 BNC Connectors	 High sensitivity (2 uV) antenna input and a high power input/output for direct connection of transceivers of up to 100 W transmitter power.
Sensitivity (Narrow selectivity) FM/PFM	 2uV (0.6uV typical) SINAD = 10dB (PFM mode). **NOTE** PFM mode recommended for best sensitivity with narrow band (5 kHz peak deviation) radios.
AM	2 uV typical for S/N = 10dB. Frequency ≥10 MHz.

Table 1-1. CE-5110 Series Specifications (Cont'd)

ITEM	CHARACTERISTICS
Selectivity/Squelch	Selectes IF bandwidth.
Narrow	22 kHz.
Wide	50 kHz at 3dB points. Concentric controls adjust squelch and receiver sensitivity.
Frequency Error Meter	Zero centered meter reads error offset from dialed-in frequency.
Ranges	±1.5, ±5, ±15 kHz.
Resolution	50 Hz.
Accuracy	±.000001 ± (time base stability).
FM Deviation	FM peak deviation read simultaneously on meter and CRT display.
Ranges, meter and CRT	1.5, 5, and 15 kHz peak.
Accuracy	5% full scale on meter.
AM Modulation	% AM modulation read simultaneously on CRT display and calibrated meter.
Meter Range	0 to 100%.
CRT Range	±15, ±50, and ±150%.
Accuracy	5% of meter scale.
Power Meter	
Frequency	10 to 500 MHz (usable to 1000 MHz).
Ranges	1 to 10, 10 to 100 watts.
Accuracy	10%.
Sinad Meter	10, 12, and 20dB, ±2dB at 20dB markings.
Frequency	1000 Hz.
Internal Tone	Connects audio generator to horizontal scope input for Lissajou frequency measurements.
FM Residual Noise	≥100Hz (PFM, fc ≥10MHz, 20uV input, narrow selectivity).
Demod OUT	
Level	2 volt peak-to-peak for 15kHz FM deviation, typical.
Audio Synthesizer	
Frequency Modes	
GEN	10.00 to 9999 Hz.
Gen + 1 kHz	Simultaneous 1 kHz tone + GEN frequency.
Accuracy	
GEN	±0.005% ±20 PRM/year.
1 kHz	±Time base stability.

Table 1-1. CE-5110 Series Specifications (Cont'd)

ITEM	CHARACTERISTICS
MOD OUT Level Range	0-2 volt peak-to-peak into 1 kilohm typical. Separately adjustable controls for GEN frequency and 1 kHz tone.
Burst	Tone burst adjustable from .03 to 1.0 second.
Interrupt	Phone jack input for switching audio signal on and off.
Oscilloscope	
Frequency Range	DC to 1 MHz, 3dB bandwidth (usable to 3 MHz).
CRT Scale	7 divisions high x 10 divisions wide.
Vert Sensitivity	
Calibrated	5 mV/DIV., 50 mV/DIV. 0.5 V/DIV. 5 V/DIV., ±5%.
Uncalibrated	Continuously adjustable between ranges.
Horizontal Sweep Rate	
Calibrated	10 msec/DIV, 1 msec/DIV, 100 u sec/DIV, 10 u sec/DIV, ±5%, 1 u sec./DIV. ±10%.
Uncalibrated	Continuously adjustable between ranges.
External Input Impedance	1 MEGOHM ±5% in parallel with 30 pF.
General	
Weight	39 lbs. (17.7 kg).
Dimensions	
Height	9 5/8 inches.
Width	11 1/8 inches.
Depth	18 1/4 inches.
Power Sources	115/230 VAC +10%. 50-400 Hz, 48 watts. External 11-15 volts DC at 3.8 amps.
Frequency Stability, Time Base	
TCXO	±.00001 per year after 30 seconds, ±.000003 month after 30 days.
Oven (Option 02)	±.000002 per year after 25 minutes at 25°C.
Frequency Selection	Seven decade lever switches. Each switch selects digits 0-9.
Automatic Overload Protection	SIG GEN OUT/RF IN port automatically protected in SIG GEN mode against accidental transmitter keying.
Maximum Power	100 watts for 10 seconds.

Table 1-1. CE-5110 Series Specifications (Cont'd)

ITEM	CHARACTERISTICS
Temperature Operating Range	0°C to +55°C (32°F to 131°F).
Options	
02	High Stability Oven Controller Crystal Oscillator. (OCXO).
04	High Sensitivity Frequency Error Meter.
Tracking Generator (TG™)	Swept frequency output is exactly equal to input frequency of SPECTRUM MONITOR.
Frequency Range	10 MHz to 999.9999 MHz. Usable from 450 kHz.
Sweep Widths	
Fixed	10 kHz, 100 kHz, 1 MHz, 100 MHz per division.
Variable	10 MHz to >300 MHz. (100 MHz/DIV only)
Output Level	0.1 uV to 300 mV, continuous.
Output	
BNC Connector	SIG GEN OUT. ON/OFF control on FINE attenuator control knob.
Internal Leakage	60dB typical below 0dB reference on SPECTRUM MONITOR display with fine attenuator below -10dB level.
Display Mode	NORM, SPECTRUM MONITOR EXT, TRACKING SCOPE.
Display Range	60dB typical on SPECTRUM MONITOR with fine attenuator control below -10dB.
Dynamic Range	
>10 MHz	≥100dB, typical.
455 kHz to 10 MHz	≥70dB, typical.
Accessories	
Supplied with monitor	Front cover, power cord, RF cable, CRT hood, whip antenna, and operating service manual.
Also available:	
5287-0051	Protective cover with shoulder strap.
5287-0052	Shipping trunk.
7021-0010	Vehicle cigarette lighter power cord.

Table 1-1. CE-5110 Series Specifications (Cont'd)

ITEM	CHARACTERISTICS
Additional Specifications for CE-5110A	
Spectrum Monitor	
Frequency range	10 to 100 MHz (usable to 100 kHz).
Dynamic Range	+0 to -115dBm.
RF Attenuator	≥40dB in 20dB steps.
Display Range	70dB (10dB/DIV) and 7dB (1dB/DIV).
Vertical Offset Range	≥20dB (1dB/DIV. only).
Level Accuracy	±4.5dB (S/N ≥20dB).
Scan Widths	
Fixed	10 kHz/DIV, 100 kHz/DIV., 1 MHz/DIV, MHz/DIV.
Variable	10 to >350 MHz.
Minimum Resolution	3 kHz for 2 equal signal levels.

the functions of a transceiver can be completely checked.

1.09 Spectrum Monitor, with 1dB/DIV resolution, provides accuracy for fine tuning adjustments. These adjustments include tuning repeater duplexers and other filters for minimum insertion loss.

1.10 The cable fault locator pin-points the exact location of antenna cable system defects.

SPECIFICATIONS

1.11 Specifications for the CE-5110 are listed in Table 1-1.

1.12 Each CE-5110 is shipped with an accessories package containing a telescoping whip antenna which connects to the ANT input connector, a 74" coaxial cable, a hood for improved CRT viewing, a power cord, a front cover, and a service manual. Accessories which are also offered include a shipped trunk, a soft zippered cover with shoulder strap, and a cigarette lighter power cord.

1.13 Also available are the Cushman CE-50 series Communications Monitors which contain all the capabilities of the CE-5110 except the Offset Generator and cable fault locating features. For further information, contact Cushman Electronics.

SECTION 2
INSTALLATION

INTRODUCTION

2.01 Installation of the CE-5110 Communications Monitor consists of Environmental Requirements, Power Requirements, Service or Repair, Preparation for Shipment, and Receiving.

ENVIRONMENTAL REQUIREMENTS

Temperature

2.02 The CE-5110 operates between 0°C and +55°C (ambient). In the field these temperatures can easily be exceeded if proper precautions are not taken. The internal temperature of a closed automobile trunk may exceed +65°C during summer daylight hours. Also, care should be taken not to block the cabinet's ventilating ports. Exceeding the upper or lower temperature limits for extended periods may not result in noticeable damage to the instrument, but may cause poor performance or actual malfunctioning.

RF Fields

2.03 Where extremely high RF radiation fields exist (such as when the CE-5110 is used near a transmitter) the telescoping antenna should be pushed together to reduce pick-up. Where many high-power transmitters are in use, adjacent channel interference may be experienced. In such cases the SENSITIVITY switch should be moved to a lower (clockwise) level and the SELECTIVITY switch on the Front Panel should be placed in the NARROW position. If satisfactory measurements still cannot be made, direct connection between the transmitter to be monitored and the Communications Monitor (through a suitable RF attenuator) may be required. For further information, contact the Cushman Electronics Customer Service Department.

NOTE: In the NARROW position the bandwidth is reduced so that Deviation readings may be degraded unless the sum of the modulation frequency plus the frequency deviation is less than 11 kHz.

POWER REQUIREMENTS

2.04 The CE-5110 may be operated from a 115V AC or 230V AC ±10%, 50-400 Hz source, or an external +12V DC source. The AC and EXT DC voltage (EXT DC, or AC) is selected at the Monitor Front Panel, while the AC voltage level is selected at the Rear Panel switch. The Rear Panel switch should be set so that the voltage of the AC source shows on the switch. The instrument consumes a nominal 48 watts of power in the AC position of the Front Panel switch, and a nominal 40 watts in the EXT DC position.

SERVICE OR REPAIR

2.07 When factory service or repair is required, for further service information, or to make arrangements for shipment to the factory, or Service Center; contact Cushman Electronics Customer Service Department. The factory addresss is:

Cushman Electronics, Inc.
Customer Service Department
2450 North First Street
San Jose, California 95131
Telephone: (408) 263-8100

2.08 Cushman Electronics repair service is also available from regional Service Centers listed in the Appendix of this manual. Factory warranty and other services may be performed at these locations. To speed the return of your equipment and lessen your shipping costs, use the Service Center nearest you when applicable. You must contact either the factory or the regional Service Center before shipping any equipment for repair. Service will be scheduled at that time and you will be advised of the best method of shipment.

PREPARATION FOR SHIPMENT

2.09 Ship the CE-5110 in the original packaging material (See Figure 2-1) if possible. In the event that the material has been lost or damaged, a replacement can be purchased by contacting Cushman Electronics Customer Service.

2.10 The following is a general guide for repackaging the instrument to minimize the possibility of damage during shipment.

NOTE: Before packing the Monitor for shipment to the factory or regional service center for repair, attach a tag with the following information:

* Owner's name
* Instrument Model Number
* Instrument Serial Number
* Service or repair required

2.11 Identify the unit by serial number and model number in all correspondence with the factory or service center.

2.12 Ship the Monitor in the original container as follows (See Figure 2-1):

a) Place the cardboard support on top of the foam cushion.

b) Place the tagged instrument on top of the cardboard support.

c) Place the second support on top of the instrument.

d) Place the packing foam on top of the second cardboard support, to the top of the container.

e) Place the third cardboard support on top of the foam.

f) Close the container and seal with strong tape.

2.13 To ship the instrument in material other than the original packaging, proceed as follows:

a) Wrap the tagged instrument in heavy plastic or paper.

b) Place the instrument in an inner container.

c) Place packaging foam around all four sides of the container.

d) Place the packaging material and the instrument into a heavy box.

e) Close and seal the container with heavy tape.

f) Mark the shipping container as follows:

DELICATE
ELECTRONIC INSTRUMENT
FRAGILE

g) Ship the Monitor to the following address:

Cushman Electronics Inc.
Customer Service Department
2450 North First Street
San Jose, CA 95131

RECEIVING

2.14 When received, the CE-5110 will be packed in a shipping box with foam packaging material to protect the unit during shipment. Retain the shipping box and foam packaging in case it becomes necessary to ship the instrument for any reason.

2.15 Remove the Monitor from its shipping carton by carefully cutting the sealing tape on the carton and removing the packaging foam (See Figure 2-1). Inspect the unit for shipping damage. If any damage has occured, notify the shipper, not Cushman Electronics.

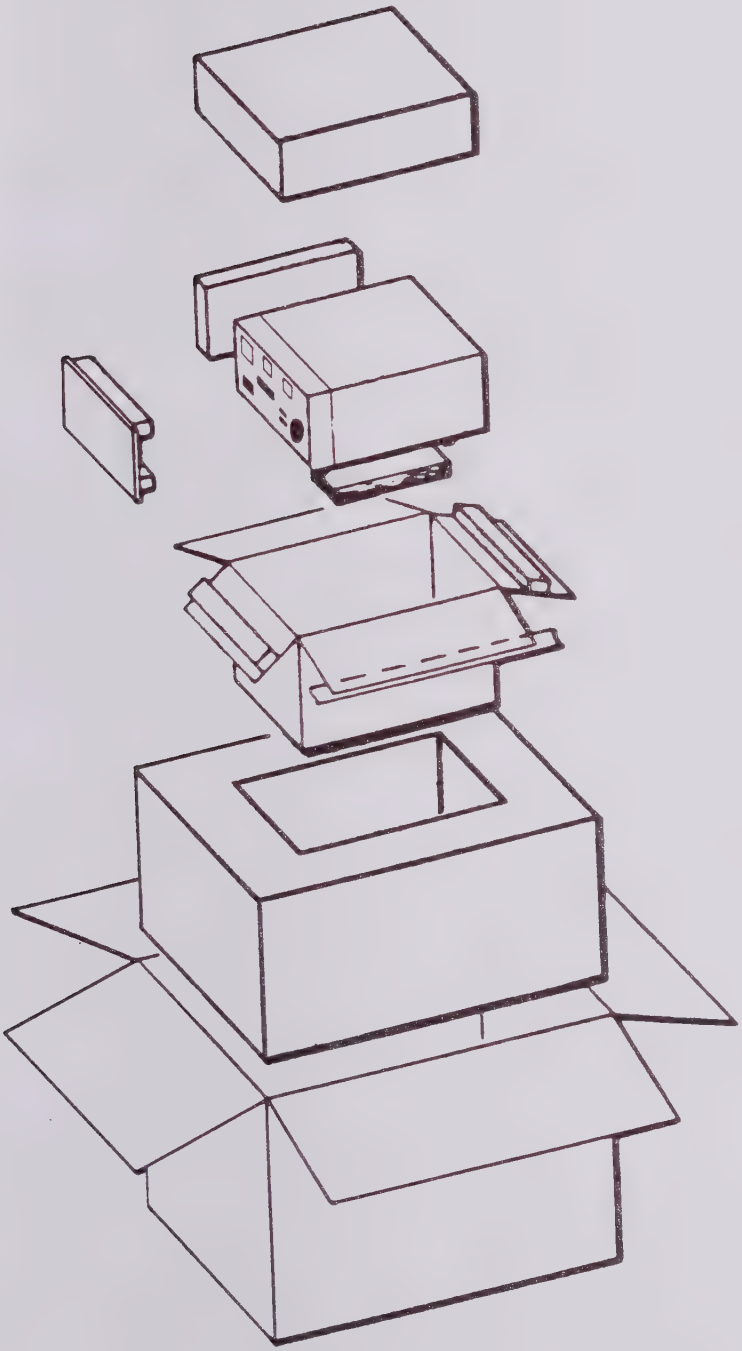


Figure 2-1. CE-5110 Packaging Material.

SECTION 3
OPERATION

GENERAL

3.01 The CE-5110 Front Panel controls, indicators, and connectors are shown in Figure 3-1 and listed in Table 3-1 with a brief description of the function of each.

3.02 When received, the CE-5110 can be operated immediately on AC or external DC power.

TURN-ON AND WARM-UP

3.03 For AC operation, plug the power cord into a 115V AC or 230V AC, ±10%, 50-400 Hz source receptacle. For external DC operation, connect Rear Panel external DC receptacles into a +12V DC source (positive to postive and negative to negative). No other connection is necessary.

3.04 The standard CE-5110 contains a temperature compensated crystal oscillator (TCXO) time based. The minimum time required for warm-up is 30 seconds.

3.05 If the OCXO is used in place of the TCXO a longer warm-up period is required before CE-5110 measurements can be made. See the entry in Table 1-1 (Specifications) TIME BASE under OCXO Warm-up Time. The OCXO will maintain the master oscillator crystal at a constant temperature for optimum CE-5110 measurement accuracy. If the instrument has been stored at a temperature below 0°C (32°F), additional warm-up time may be required.

MONITOR OPERATION

Carrier Frequency Measurements

3.06 Make the following connections and control settings:

a) Turn on the instrument and allow it to warm-up as shown in paragraphs 3.02 through 3.05.

b) Connect an external antenna, or the telescoping antenna supplied with the instruments, to the ANT connector on the Front Panel.

c) Set the MHz (Frequency Select) switches to the frequency to be monitored.

d) Set the FUNCTION switch to MONITOR.

e) Adjust the squelch control until the SIGNAL LEVEL LED just lights when the transmitter is keyed.

f) Set the RANGE (kHz) switch to the lowest frequency range which will give an on-scale reading of the FREQ ERROR Meter. The reading is a difference between the dialed frequency and transmitter carrier frequency.

NOTE: OFFSET GENERATOR must be in OFF position.

Frequency Deviation Measurements

3.07 FM or %AM and Pulsed FM frequency deviation can be measured as follows:

a) Repeat steps a) through c) of paragraph 3.06.

b) Set the FUNCTION switch to MONITOR FM/AM or PFM as required.

c) Adjust the SQUELCH control (from the least sensitive position) until the SIGNAL LEVEL LED just lights as the transmitter under test is keyed.

d) Set the METER FUNCTION switch to the lowest DEV (kHz) range which will give an on-scale reading of the FUNCTIONS Meter (%AM for AM testing).

e) If it is desired to view the demodulated FM/AM or PFM on the oscilloscope, turn on the oscilloscope with the INTEN/SCOPE OFF control. Adjust the INTEN and FOCUS controls for a sharp, clear trace on the CRT. Center the trace on the CRT with the HORIZ and VERT oscilloscope controls.

f) Key the transmitter and read the deviation on the FUNCTION Meter or oscilloscope. On the oscilloscope CRT, peaks appear above and below the horizontal center line of the display. The FUNCTIONS Meter indicates the positive or negative (as selected by peak

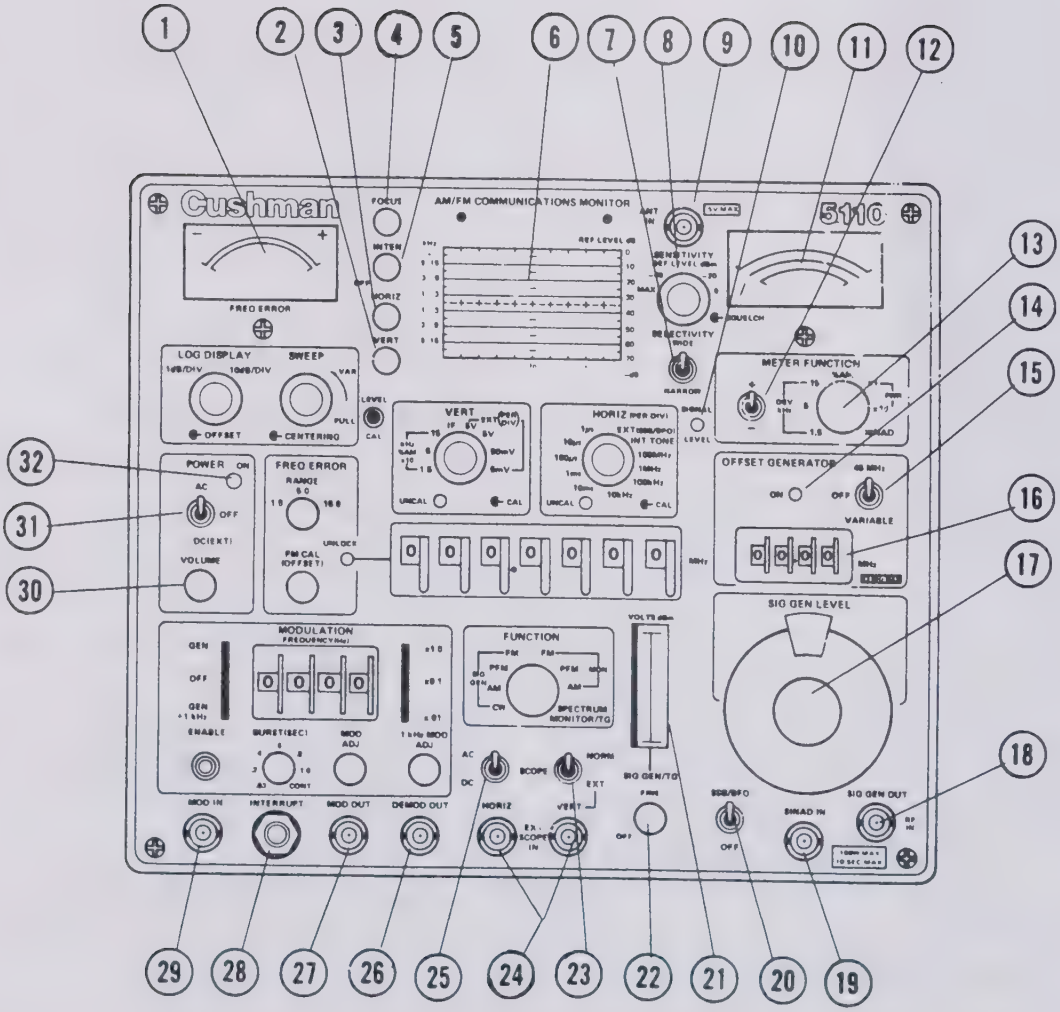


Figure 3-1. CE-5110 Controls and Indicators.

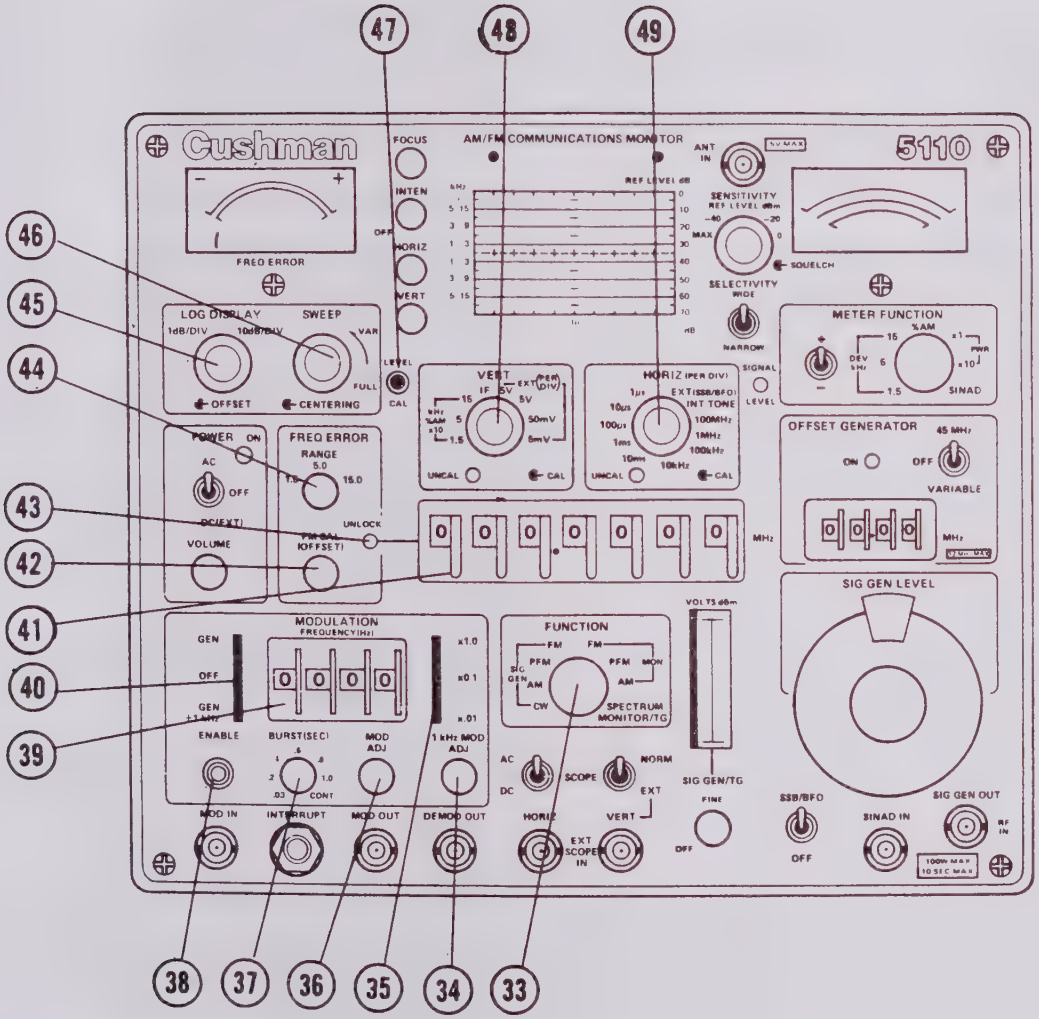


Figure 3-1. CE-5110 Controls and Indicators. (Cont'd)

Table 3-1. CE-5110 Front Panel Controls, Indicators, and Connectors.

CONTROL	FUNCTION
1. FREQ ERROR	Meter indicates the difference in frequency between the received or generated frequency and the frequency dialed on the Monitor.
2. VERT	Controls the vertical positon of the CRT display.
3. HORIZ	Controls horizontal positioning of the CRT display.
4. FOCUS	Adjusts sharpness of trace.
5. INTEN/SCOPE OFF	In the SCOPE OFF (detented) position, removes CRT diplay power. In other than SCOPE OFF it adjusts the brilliance of the CRT trace.
6. CRT Display	In normal oscilloscope mode, displays modulated signals received or generated by the Monitor. Using EXT SCOPE inputs, can also be used as a 1 MHz oscilloscope. An automatic sync circuit locks the sweep to the incoming signals. In the CE-5110 SPECTRUM MONITOR mode, it displays signal spectrums up to 1 GHz over a 110dB range.
7. SELECTIVITY	Selects the receiver IF bandwidth (Wide or NARROW) for the Monitor functions.
8. SENSITIVITY (SQUELCH)	The outer knob selects RF input sensitivity while the inner (SQUELCH) adjusts the level at which the monitor receiver circuits will allow an input signal to pass.
9. ANT	Antenna or high sensitivity input to Monitor.
10. SIGNAL LEVEL	LED lights (in MON mode) when the selected RF signal exceeds the squelch level and can be measured, or when in SIG GEN.
11. FUNCTION METER	Meter measures DEV (kHz), %AM, SINAD, or input PWR when functions are selected at the METER FUNCTION switch.
12. DEVIATION (+,-)	Selects whether positive or negative peaks of the deviation are to be measured.
13. METER FUNCTION SWITCH	Switch selects functions to be measured on the DEV (kHz)/PWR/%AM/SINAD Meter.
14. OG ON LED	OFFSET GENERATOR (OG) LED lights whenever OG is turned on.

Table 3-1. CE-5110 Front Panel Controls, Indicators, and Connectors. (Cont'd)

CONTROL	FUNCTION
15. 45 MHz/OFF/VARIABLE	Switch is used to turn on the OFFSET GENERATOR (OG) by selecting either the fixed 45 MHz OG offset (for 800 MHz repeaters) or VARIABLE OG offset as set by the OG MHz Thumbwheel switches
16. OG MHz SWITCHES	Used to set the OG variable frequency offset from 00.10 to 12.00 MHz, in 10 kHz steps.
17. SIG GEN LEVEL (attenuator)	RF output attenuator which adjusts the SIG GEN OUT level in 10dB steps from 0.1 microvolts to 300 mV rms.
18. SIG GEN OUT/RF IN	BNC connector for the generated output RF signal from the Monitor, or the input power to be measured. Protected from accidental transmitter keying by automatic overload protection.
19. SINAD IN	BNC input to measure the 10, 12 and 20dB SINAD sensitivity of a receiver under test. Reading is made on the FM DEVIATION/%AM/POWER/SINAD meter.
20. SSB/BFO	Signal Side Band Beat Frequency Oscillator
21. SIG GEN LEVEL (meter)	Meter has three scales and is used directly with the SIG GEN LEVEL attenuator. The left scale is marked 0-10, the center scale, 0-3 and the right scale from -10dB to +3dB for use as verniers of the 1/.1/.01, 3/.3/.03, and 10dB step scales of the SIG GEN LEVEL attenuator respectively (as set by the FINE LEVEL (OFF) control).
22. FINE (OFF)	Provides an adjustment of the SIG GEN OUT level between the 10dB attenuator settings to give continuous coverage of output level. The OFF position turns off the output RF. CE-5110 used to enter TRACKING GENERATOR or TRACKING Scope mode.
23. NORM/EXT (VERT)	Allows scope to be used in the "TRACKING SCOPE" mode.
24. EXT SCOPE INPUT (AC/DC)	External input for vertical CRT deflection. Used when CRT is used as an oscilloscope.
25. EXT SCOPE INPUT (AC/DC)	Switch selects AC or DC input coupling on the EXT SCOPE INPUT (VERT) jack.
26. DEMOD OUT	Makes the recovered audio from the RF signal.

Table 3-1. CE-5110 Front Panel Controls, Indicators, and Connectors. (Cont'd)

CONTROL	FUNCTION
27. MOD OUT	BNC jack makes the modulation signals available for external use.
28. INTERRUPT	Used with BURTS (SEC) switch in CONT position, the INTERRUPT phone jack allows external control of modulation frequency duration.
29. MOD IN	Input BNC for an external modulation source.
30. VOLUME	Adjusts the volume of the internal speaker.
31. POWER (AC/OFF/DC (EXT))	Selects the input power source for the CE-5110.
32. POWER LED	LED lights when power is supplied to the unit (turned on).
33. FUNCTION	Switch selects either the SIG GEN or MONITOR mode of operation and the type of modulation used. Also used in CE-5110 to selects SPECTRUM MONITOR functions.
34. 1 kHz MOD ADJ	Adjusts level of the 1 kHz tone generator.
35. MODULATE (X1.0, X0.1, X.01)	Three position lever switch selects the multiplier for the MODULATION-Frequency (Hz) switches. This sets the modulation frequency range. For example, the maximum modulation frequency in X1.0 is 9999 Hz; in X0.1 it is 999.9 Hz, and in X.01 it is 99.99 Hz.
36. MOD ADJ	Adjusts the level of the Modulation Signal at the MOD OUT jack.
37. BURST (SEC)	Selects the duration (.03-1 sec.) of the audio tone dialed on the MODULATION-Frequency (Hz) switches.
38. ENABLE	Push-button switch turns on the audio oscillator for a period of time that has been pre-selected by the the BURTS control.
39. MODULATION-Frequency (Hz)	Four thumbwheel switches select the audio frequency (from 0 to 9999 Hz) used in the audio generator. The audio is used for internal modulation and for MOD OUT signal.
40. MODULATION (GEN/OFF/GEN + 1 kHz)	Modulation source select. The GEN position selects dialed-in frequency. OFF turns off the internal audio generators. The GEN + 1 kHz position causes a 1 kHz tone to be added to the dialed frequency.

Table 3-1. CE-5110 Front Panel Controls, Indicators, and Connectors. (Cont'd)

CONTROL	FUNCTION
41. MHz (Frequency Select)	Switches select frequency of interest (in MHz) for frequency monitor, signal generator, SPECTRUM MONITOR and TG™ modes.
42. FM CAL (OFFSET)	Adjusts the FM calibration offset for FREQUENCY ERROR meter.
43. UNLOCK	LED lights when the frequency synthesizer is not locked on frequency.
44. RANGE (kHz)	Range selection switch for the FREQ ERROR meter.
45. LOG DISPLAY SWITCH (OFFSET)	The outer of the two knobs is used to select either the 10dB/Division or 1dB/Division scale of the SPECTRUM MONITOR functions on the CE-5110. The inner OFFSET control is used to position the trace vertically and correct for test-lead losses in the 1dB/Division display.
46. SWEEP (CENTERING)	The outside (SWEEP) control is used to select either normal, or variable 10-350 MHz. (100 MHz/Div only) sweep. The inside (CENTERING) control is used to center the variable sweep being displayed.
47. LEVEL CAL	LEDs indicate that the vert and HORIZ vernier controls are not in the detented (CAL) position.
48. VERT	The outer 8 position switch selects calibrated vertical sensitivities for the CRT display. The inner detented vernier control increases the sensitivity between the selected sensitivity and the next higher (CCW) sensitivity on the switch.
49. HORIZ	The outer 11 positions switch selects calibrated time frames (in time per division) for the oscilloscope display. When the CE-5110 SPECTRUM MONITOR is selected, the CRT display is calibrated in frequency per division with the CE-5110 dialed-in frequency displayed at the CRT center. The inner detented vernier control increases the time per division continuously from selected (detent position) to the next higher time per division.

switch) deviation peaks. If needed, refer to paragraph 2.02 for use of the WIDE/ NARROW positions of the SENSITIVITY and SELECTIVITY switches in the presence of strong RF fields.

g) Adjust the VOLUME control for desired output level of the demodulated audio through the speaker. The demodulated out put is also available at the DEMOD OUT connector.

Modulation Measurement Using INT TONE

3.08 The following procedure is to be used to measure transmitter modulation using the Communications Monitor in the INT TONE positions.

a) Set the Monitor controls as in paragraph 3.05.

b) Turn on the oscilloscope with the INTEN/SCOPE OFF control. Adjust the INTEN and FOCUS controls for a sharp, clear trace on the CRT.

c) Set the MODULATION-Frequency (Hz) Thumbwheel switches to the modulation frequency to be measured.

d) Center the trace with the VERT oscilloscope control and switch the HORIZ control to INT TONE.

e) Turn the MOD ADJ control until a circular or elliptical Lissajou pattern can be seen on the CRT.

f) Adjust the MODULATION-Frequency (Hz) switches until a steady, non-rotating Lissajou pattern is observed. The input modulation frequency is that frequency selected on the MODULATION Frequency (Hz) switches when the Lissajou pattern is steady times the number of wave forms in the pattern.

SIGNAL GENERATOR OPERATION

CW Mode

3.09 Make the following connections and control settings:

a) Turn on the CE-5110 (refer to paragraphs 3.03 to 3.05).

b) Set the FUNCTION switch to SIG GEN - CW and set the MHz (Frequency Select) switches to the desired frequency.

c) Turn the MODULATION, GEN/OFF/GEN +1 kHz switch to the OFF position. Make certain there is no connection to the MOD IN jack.

d) Set the SIG GEN LEVEL 10dB attenuator to the level desired from 0 to -120dBm. To set the level betwen 10dB steps, adjust the FINE/OFF control.

NOTE: The OFF position of the FINE/ OFF control removes the output signal from the SIG GEN OUT connector. The control cannot be in the OFF position for signal generation.

e) The level at the SIG GEN OUT/RF IN connector is displayed as a combined reading of the SIG GEN LEVEL 10dB attenuator setting and the FINE/OFF control setting.

f) Connect the SIG GEN OUT connector to the instrument to be tested. The Communications Monitor is protected against inadvertent transmitter keying by an automatic switching circuit which directs transmitted power to the power measuring circuit.

FM Mode

3.10 Make the following connections and control settings:

a) Turn on the CE-5110 (refer to paragraphs 3.02 to 3.05).

b) Set the FUNCTION switch to SIG GEN - FM and select the desired RF output frequency on the MHz (Frequency Select) switches.

c) When the FUNCTION switch is set to SIG GEN - FM the FREQ ERROR Meter may peg. Allow 10 - 15 seconds for the meter to return to zero before proceeding. If it doesn't, adjust the FREQ OFFSET control to zero the meter. This calibrates the FM center frequency to the same as that dialed

on the MHz (Frequency Select) switches for error-free meter readings.

d) Set the MODULATION - GEN/OFF/GEN + 1 kHz switch to the GEN position.

e) Set the MODULATION - Frequency (Hz) switches to four figures representing the desired audio frequency. Set the multiplier switch (MODULATION - X1.0/X0.1/X.01) to place the decimal point in the four figure setting. For example: set the Thumbwheel switches to 4567. Set the multiplier switch to X.01. The modulating frequency will be 45.67 Hz.

f) The amount of FM modulation can be set from 0-15 kHz deviation by the MOD ADJ control. To set it to the level desired, place the METER FUNCTIONS switch to be DEV (kHz) 15 position (if less deviation is needed, a lower deviation frequency position may be used). Monitor the FUNCTION meter while adjusting the MOD ADJ control to the desired FM frequency deviation. The modulating signal can also be monitored by turning on the oscilloscope and viewing the displayed signal. The modulated RF output frequency will be available at the SIG GEN OUT and MOD OUT connectors.

g) For external modulation, connect an external signal source to the MOD IN connector. Both the internal modulating signal and external frequency will modulate the output RF if the MODULATION - GEN/OFF/ GEN + 1 kHz switch is in the OFF position, only the external source will modulate the RF signal.

h) To simultaneously modulate the CE-5110 output RF with an audio frequency plus a constant known frequency, place the MODULATION - GEN/OFF/ GEN + 1 kHz switch in the GEN + 1 kHz position. The audio frequency is selected by the MODULATION-Frequency (Hz) switches, while the 1 kHz is constantly applied. The 1 kHz modulation level can be adjusted by the 1 kHz MOD ADJ control.

EXTERNAL OSCILLOSCOPE OPERATION

3.11 The Communications Monitor oscilloscope can be operated separately from normal monitor operation as a DC to 1 MHz oscilloscope. To operate, make the following connections and control settings:

a) Turn on the CE-5110 (refer to paragraphs 3.03 to 3.05).

b) Turn on the Oscilloscope with the INTEN/SCOPE OFF control. Adjust the INTEN and FOCUS controls for a sharp, clear trace on the CRT. Center the trace on the CRT with the HORIZ and VERT oscilloscope controls.

CAUTION

Prolonged display of a stationary signal or trace of high intensity may damage the CRT phosphor coating. The intensity should not be set higher than necessary for comfortable viewing.

c) Set the EXT SCOPE INPUTS (AC/DC) switch to the position corresponding to the type of signal being measured.

d) Place the VERT switch to the EXT 5V/DIV position and the HORIZ switch to the 1 microsecond to 10 millisecond position which gives the best signal for viewing.

e) Connect the external signal to the VERT input connector. The signal level or VERT switch may now be changed to display a signal on the CRT of sufficient amplitude for viewing.

TRANSMITTER POWER MEASUREMENTS

3.12 The CE-5110 can read transmitted RF power on the FUNCTIONS meter from 10 MHz to 500 MHz in two ranges: 0 -10 watts and 0 - 100 watts. For power measurements make the following connections and control settings:

CAUTION

To prevent circuit damage, observe the following precautions during power measurements:

1) For PWR (in) not greater than 5 watts, power can be applied for three minutes maximum with 90 seconds between measurements.

2) For PWR (in) greater than 5 watts, but less than 100 watts, a maximum 10 second power measurement made with a minimum of 10 minutes between measurements.

3) With option M-41 unit can accept up to 100 watts for 15 minutes with audio warning when temperature rise is excessive.

a) If the signal to be read is known to be less than 10 watts power, set the METER FUNCTIONS switch to the PWR x 1 position. If the signal is greater than 10 watts or is unknown (but less than 100 watts), set the METER FUNCTIONS switch to the PWR x 10 position.

b) Connect the signal to be measured to the SIG GEN OUT/RF IN jack.

NOTE: Anytime an RF input is sensed at the SIG GEN OUT/RF IN connector when the FUNCTIONS switch is in other than the PWR x 1 position, the circuits will automatically switch to the PWR x 10 level and display the power level on the FUNCTIONS meter.

c) Read the input power level displayed on the FUNCTIONS Meter.

SPECTRUM MONITOR OPERATION

General

3.13 The CE-5110 Spectrum Monitor has selectable scan widths of 10 kHz, 100 kHz, 1 MHz and 100 MHz PER/DIV. It has a Variable Scan width (in 100 MHz position only) of 10 to 350 MHz and can detect RF levels (Tangential Sensitivity) -130dBm.

Spectrum Monitoring

3.14 Make the following connections and control settings:

a) Set the FUNCTION switch to the SPECTRUM position. This will disable all Front Panel controls not connected with the spectrum monitor function except for CRT controls and Frequency Select switches. It will also cause the UNLOCK LED to light and remain on to alert the operator that the CE-5110 is not fully in the SPECTRUM MONITOR mode until step b) is completed.

b) Place the HORIZ (PER/DIV) switch to the SPECTRUM MONITOR position (scan width) of 100 kHz or MHz desired for signal monitoring.

NOTE: Whenever the CE-5110 HORIZ (PER/DIV) switch scan width, or the MHz (Frequency Select) switches are changed, the CRT display will blank for a few seconds while the automatic centering circuits recalibrate the signal position to the center of the CRT. Blanking prevents the reading of incorrect input data during the calibration period.

c) Set the MHz (Frequency Select) switches to the frequency of the signal to be monitored.

d) Set the SENSITIVITY and SQUELCH to maximum sensitivity.

e) Connect the signal to be measured to the ANT connector on the CE-5110 Front Panel.

f) The absolute level of the input signal will be the RF signal level measured on the CRT plus the setting of the Sensitivity switch.

g) The amount by which the input frequency differs from the frequency selected on the MHz (Frequency Select) switches can be determined by multiplying the scan width selected on the HORIZ (PER/DIV) switch by the number of major divisions from center

at which the input signal appears on the CRT. For example, if the frequency selected is 300 MHz, and the scan width is at 100 kHz PER/DIV, then a PER/DIV, then a signal two divisions to the left or right of CRT center would be 200 kHz away from the 300 MHz Center Frequency (CF). To determine the frequency of the offcenter signal, algebraically add the amount by which the signal differs from the selected center frequency. Signals to the left of the CRT center are negative, and those to the right are positive, then in the example above, a signal two major divisions to the left (-200 kHz) of the 200 MHz CF would be at 299.8 MHz, while the signal to the right of CF (+200 kHz) is at 300.2 MHz. Typically, a frequency can be read on the CRT with an accuracy of plus or minus 2 kHz. If a more precise frequency determination is needed, switch the FUNCTION switch to the FM or PFM position and read the frequency error on the FREQ ERROR meter. This reading can then be algebraically added to the center frequency as described above to determine the input signal frequency.

3.15 Using Offset Generator to set Repeater Audio Level.

a) Disconnect receiver from duplexer system and connect SIG GEN OUT to receiver input. Attach monitor antenna to ANT in connector.

b) Set FUNCTION switch to SIG GEN-FM.

c) Set the SIG GEN OUT, FINE control to ON full ccw; Set 10dB step attenuator to -120 dBM.

d) Set FREQUENCY SELECT switches to the repeaters transmitter frequency.

e) Set METER FUNCTION switch to 5 kHz DEV.

f) Set VERT switch to 5 kHz DEV.

g) Set HORIZ switch to 1 millisecond/DIV.

h) Set FREQ ERROR switch to 1.5 kHz RANGE and zero FREQ ERROR METER using FM (CAL) OFFSET control.

i) Set GEN-OFF-GEN + 1 kHz switch to GEN + 1 kHz position. Burst (sec) to con't. and MOD ADJ full CCW.

j) Increase 1 kHz MOD ADJ until proper deviation is displayed on CRT or meter.

k) Set the FUNCTION switch to MONITOR:FM.

l) Set OFFSET GENERATOR to VARIABLE (45 MHz for 800 MHz repeaters) and set Thumbwheel switches to the frequency difference between the transmitter and the receiver.

m) Increase SIG GEN LEVEL until receiver is full quieting (Disable tone coded squelch).

n) Observe CRT for deviation of transmitter. Adjust audio output of receiver to the deviation set in step j).

Tracking Generator Calibration

3.16 Using TRACKING GENERATOR to measure insertion loss, isolation, center frequency and 3dB bandwidth of filters, cavities, etc. Calibrate the Tracking Generator prior to performing any tests as follows:

a) Connect SIG GEN OUT to ANT IN using as short a coaxial cable as possible.

b) Set FUNCTION switch to SPECTRUM MONITOR/TG.

c) Set SCOPE HORIZ switch (PER/DIV) to 1 MHz position.

d) Set SENSITIVITY to -20dBm.

e) Set SIG GEN LEVEL to -30dBm and set FINE control to 0dBm on the LEVEL METER.

f) Set the LOG display to 10dB/DIV.

g) Trace should be on the CRT at the 10dB level. If not, adjust trace to 10dB line by using small screwdriver to adjust the LEVEL CAL. The Tracking Generator or Spectrum Monitor is now calibrated to the same accuracy as the SIG GEN OUT LEVEL. This calibrations should be done every time the measurement frequency is changed by more than 50 MHz.

d) Set the SIG GEN LEVEL to -20dBm.

e) Set the FINE switch to bring the trace to 0dB REF LEVEL.

f) Set the log display to 1dB/DIV.

g) Adjust the log OFFSET to bring trace back to 0dB REF LEVEL on CRT.

h)Remove the device under test and insert an adapter connector and two cables.

i) Read the insertion loss on the CRT. If the trace is not on the screen the loss is $\geq$7dB.

j) Read 3dB bandwidth directly from the CRT. Reduce the dispersion for better resolution.

3.18 Insertion Loss Measurement for Insertion Loss $\geq$6dB are as follows:

a) Perform paragraph 3.12 steps 1 thru 5.

b) Set the Log Display to 10dB/DIV.

c) Perform steps 7 through 10 of paragraph 3.17.

d) Increase the SIG GEN OUT LEVEL, then the SENSITIVITY, if required to obtain a trace on CRT.

NOTE: The maximum position on SENSITIVITY control is equal to approximately -60dBm LEVEL at the 0dB REF LINE on the CRT. The Insertion Loss is the difference between SIG GEN OUT LEVEL, including FINE LEVEL; and the LEVEL measured on the CRT. For best accuracy keep the trace in the range of 0 to 50dB on the CRT.

Measuring Cable Fault Distance

3.19 Before measuring Cable Fault Distances perform a VSWR measurment; or results may not be valid. For instruction on VSWR measurment see section 5 of this manual.

a) Connect a "T" connector to the ANT IN connector.

b) Connect a short length of double shielded coaxial cable from SIG GEN OUT to the "T" connector on ANT IN.

c) Set the FUNCTION switch to the SPECTRUM MONITOR/TG position.

d) Set the HORIZ(PER/DIV) switch to the 100 MHz position.

e) Set the SENSITIVITY switch to the -20 dBm position.

f) Connet a length of reference cable to the "T" connector. Use one foot of reference cable for every twenty feet of coaxial cable to be tested. The reference cable must be of precisely the same material as the cable to be tested.

g) Adjust the SWEEP and CENTERING knobs so that one transition is displayed on the CRT.

h) Replace the reference cable with the cable to be tested. Count the ripples and multiply that by the length of the reference cable. This is the distance from the CE-5110 to the cable fault.

NOTE: It may be necessary to move the LOG DISPLAY switch to the 1dB/DIV position to see the ripples clearly.

SECTION 4
THEORY OF OPERATION

INTRODUCTION

4.01 This section is a block diagram level discussion of the theory of operation for the CE-5110 Communications Monitor. It is divided into an Operational Description, a Functional Description, and a Circuit Card Description. The Functional Description describes the overall functions of the instrument from a block diagram viewpoint. The Circuit Card Description is a discussion of the operation of individual assemblies or subassemblies in numerical order.

CIRCUIT REFERENCE SYSTEM

4.02 The circuit Reference System is a series of numbers that make it possible to relate the actual circuit assembly to schematic diagrams, parts lists, and manual text. A complete description of the Circuit Reference System is contained in Section 6. The main reference group is designated as follows:

10000 FRONT PANEL

20000 MAIN CHASSIS, LEFT SIDE

30000 MAIN CHASSIS, RIGHT SIDE

40000 SCOPE MODULE

50000 RECEIVER CASTING

60000 MAIN CASTING, TOP

70000 MAIN CASTING, BOTTOM

80000 RF OUTPUT CASTING

90000 REAR PANEL & OFFSET GENERATOR

Right, left, top and bottom refer to the instrument viewed from the front in an upright position.

4.03 The Circuit Reference System is further divided into 1000 number groups (e.g., 41000, 42000, 43000), that represent circuit assemblies. Component references are individually numbered in a series starting with 1. Each type of component has a separate series designated by a letter or letters. The complete reference to any component includes the circuit reference number, the individual component number and the letter type indicator. Therefore, the first resistor, R1, in the 20000 circuit will be R21001, the second transistor, Q2, will be Q21002, etc. Printed circuit assemblies plugs and connectors are similarly designated with pin numbers following the component reference as a dashed number. The first plug for the 21000 circuit would be P21001, and pin 4 of that plug P21001-4. When the individual circuits are discussed in the Circuit Description the component references will be abbreviated for convenience. R1 will refer to the first resistor on the assembly under discussion only. If reference is made to a component outside that assembly, or when more than one circuit is being described, the full reference designation will be used.

OPERATIONAL DESCRIPTION

4.04 The CE-5110 Operates in three major modes, as a Communications Monitor, as a Frequency Generator and as an Offset Generator. Figure 4-1 is a functional block diagram of the CE-5110.

Monitor Operation

4.05 Operated as a Communications Monitor, the 5110 functions as a triple-conversion superheterodyne receiver over the VHF/UHF frequency range. Fixed Internal frequencies are derived from a stable and accurate Temperature Compensated Crystal Oscillator (TCXO), or optional Oven Controlled Crystal Oscillator (OCXO) Time Base.

4.06 The First Local Oscillator (LO), located in the center of Figure 4-1, is a YIG oscillator. Its 2.08-3.08 GHz frequency is set by the position of the Front Panel MHz (Frequency Select) 10 and 100 MHz switches when the FUNCTION switch is in one of the monitor positions. This frequency is mixed with the 0-100 MHz ANT IN sensitivity select signal to produce the 2075 MHz $\pm$5 1st I.F.

4.07 The 1865 $\pm$ 5 MHz Second L.O. is derived from mixing the 30-40 MHz Basic Sythesizer output, determined by the setting of the 100 Hz to 1 MHz (Frequency Select) switches, with a 200 kHz reference.

4.08 The Second LO (1865 $\pm$5 MHz) is mixed with the 2070-2080 MHz first IF, forming the Second IF of 210.7 MHz. This frequency is then

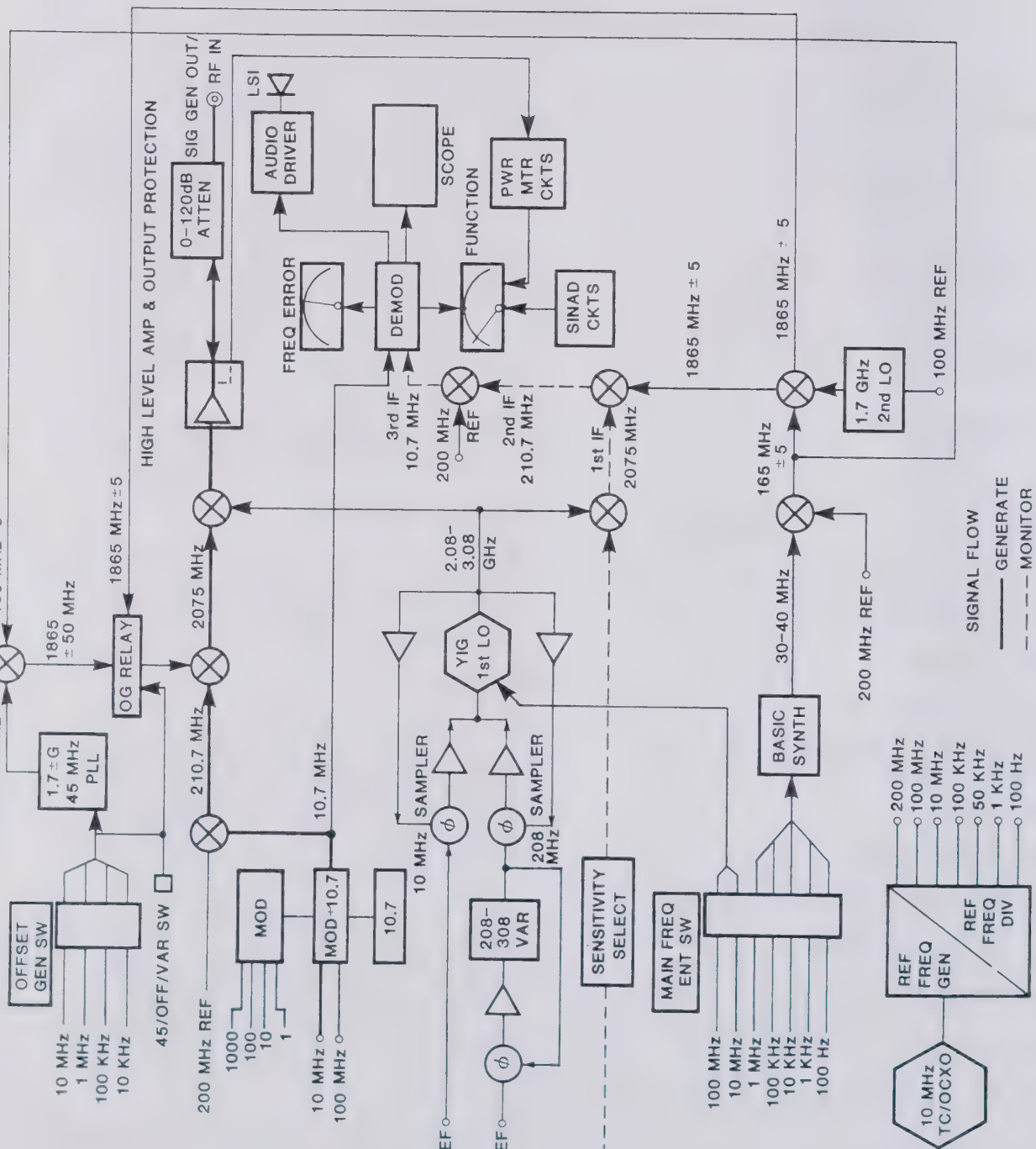


Figure 4-1. CE-5110 Fuctional Block Diagram.

mixed with a 200 MHz and the difference becomes the third and final 10.7 MHz IF.

4.09 This final IF is sent to the demodulation section where the signal characteristics are removed for display on the oscilloscope and meter circuits. All L.O. frequencies used to achieve the final IF frequency are very stable and accurate. Therefore, the signal characteristics present on the 10.7 MHz IF are the same as those on the original signal, and not just representations.

Frequency Generator

4.10 Frequency generation is achieved by a reverse process of the monitoring sequence. A 10.7 MHz VCO output is modulated by an audio frequency selected by the MODULATION FREQUENCY (Hz) switches to make the first signal generator IF. The type of modulation is selected by the Front Panel FUNCTION switch and applied to the 10.7 MHz signal.

4.11 The modulated 10.7 MHz signal is sent to the Demodulation circuits for display on the oscilloscope and meter circuits. The signal is also mixed with a 200 MHz REF to make a 210.7 MHz signal. The 210.7 MHz is mixed with the 1865 $\pm$5 MHz L.O. to make a 2075 $\pm$ MHz intermediate frequency. The 1865 $\pm$5 MHz signal is the 2ND LO through the Offset Generator (OG) relay, when the 45/OFF/VAR switch is in the OFF position. This IF is then mixed with the 2.08-3.08 GHz YIG oscillator frequency, and the difference used to make the output 0-1000 MHz RF signal. The output RF is amplified and then applied to the Front Panel SIG GEN OUT connector, through a 0-120db Step Attenuator to make a selectable RF output level for +3dBm to -127dBm.

Offset Generator

4.12 The Offset Generator (OG) function is selected by the 45/OFF/VAR switch on the front panel. This switch activates the OG relay, substituting an 1865 $\pm$50 MHz signal for the Second LO. The 1865 $\pm$50 MHz is the result of mixing 165 $\pm$5 MHz for the Basic Synthesizer with 1700 $\pm$45 MHz from the Phase Lock Loop (PLL). The frequency of the PLL is determined by the 45/OFF/VAR switch and the position of the Offset Generator switch frequency switches.

FUNCTIONAL DESCRIPTION

4.13 The PCB assemblies are divided into basic functional groups for ease of explanation. The groups are: Frequency Entry, Reference Frequencies, Frequency Loops, Monitor Section, Signal Generator Section, Audio Synthesizer, Display Conversion, Power Supplies, and Offset Generator.

Frequency Entry

4.14 The RF Select SW MTG PCB Assembly (11000) has the seven MHz (Frequency Select) switches used in both MONITOR and SIG GEN modes. Switch coding is directed through a flexible PCB assembly to other circuits requiring frequency code data.

Reference Frequencies

4.15 All reference frequencies are derived from the 10 MHz TCXO (or OCXO) Time Base (94000). This 10 MHz is input to the REF FREQ Generator PCB Assembly (37000), where it is buffered and output to other circuits. It is also multiplied to obtain 200 MHz and 200 MHz reference frequency outputs. One of the 10 MHz outputs of the REF FREQ Generator Assembly is also sent to the REF FREQ Divider/SINAD Assembly (35000), where it is divided into reference frequencies of 100 kHz, 50 kHz, 1 kHz, and 100 Hz. This assembly also contains circuits for measuring the receiver SINAD sensitivity

Frequency Loops

4.16 The major frequency determining circuits are the 1865 $\pm$ 5 MHz circuits, the 1.7 GHz Loop, the Basic Synthesizer Loop, the Offset Generator Loop, and the YIG Frequency Loop.

4.17 The 1865 $\pm$ 5 MHz frequency is used as the second L.O. (See Figure 4-2). It is generated on the VCO and Up Converter Assembly (63000), and sent to the 1865 MHz Filter and Amplifier (66000). The 1865 $\pm$ 5 MHz is derived from the summation of the 1.7 GHz Loop, and the Basic Synthesizer output. It is mixed with 200 MHz L.O on the 165 $\pm$ 5 MHz IF Assembly (61000).

4.18 The 1.7 GHz Loop is on two assemblies: the VCO and 1865 MHz Up Converter Assembly (63000) and the 1.7 GHz PLL (71000) (See Figure 4-2). The loop output goes to the VCO and 1865 MHz Up Converter Assembly mixer where it is mixed with the output of the 165 $\pm$ 5 MHz IF (61000) to make the 1865 $\pm$ 5 MHz sent to the 66000 Assembly.

4.19 The Basic Synthesizer Loop (Figure 4-3) is LOOPS A and B Divide-By-N Assembly (28000) and LOOPS A and B VCO/Phase DET Assembly (29000).

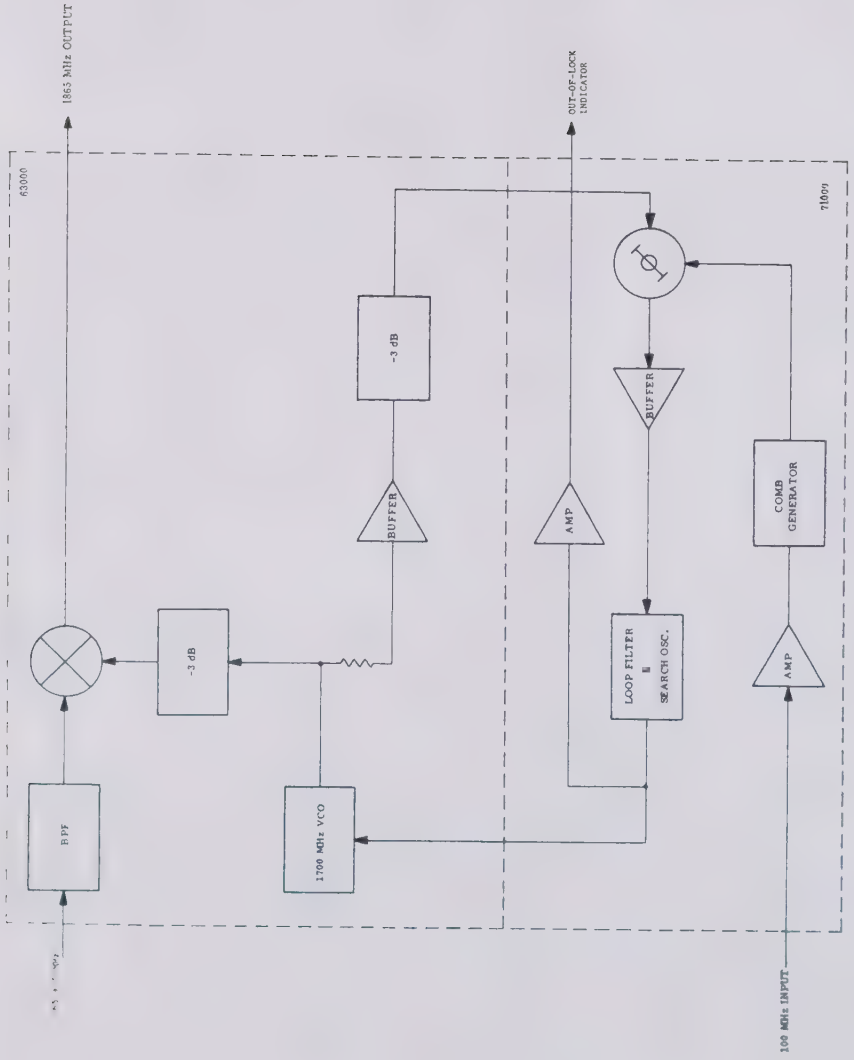


Figure 4-2. 1.7 GHz Phase Lock Loop (PLL).

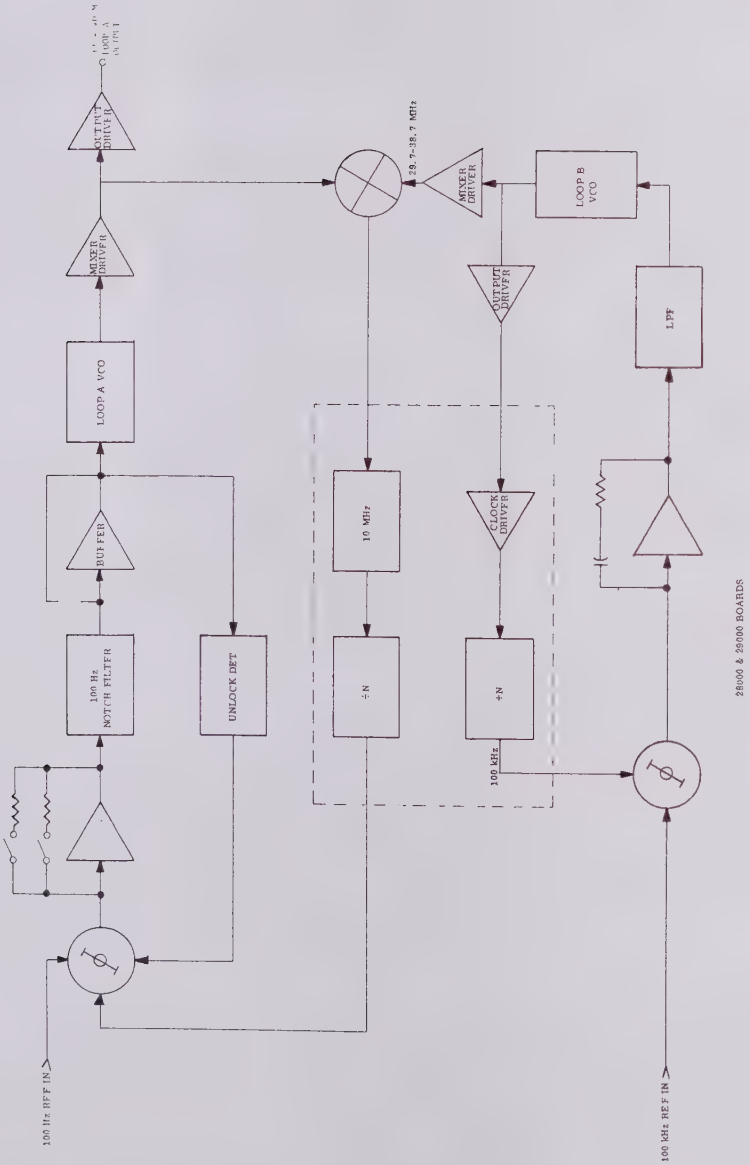


Figure 4-3. Basic Synthesizer Loop.

The 1 MHz Frequency Select switch controls the frequency of the Loop B Divide-By-N circuits, and the 100 Hz to 100 kHz switches control the Loop A frequ ency. The 30-40 MHz output from the Basic Synthesizer goes from the Loops A and B VCO/ Phase Detector (29000) to the 159.3-169.3 MHz IF (61000).

4.20 The YIG Frequency Loop Figure 4-4 is the largest of the frequency loops and includes seven PCB assemblies and the 2.08-3.07 GHz YIG Oscillator Assembly.

4.21 The YIG oscillator frequency is coursely set by the position of the 10 MHz and 100 MHz Front Panel MHz (Frequency Select) switches. The switch BCD code is input to the Digit Decode/ Divide-By-P (34000) where it is processed and sent to the YIG Main Coil Driver Assembly (33000). The signal is sent to the YIG Oscillator Main coil to coarse tune the oscillator frequency. It is amplified, filtered, buffered, and used to set the frequency of the VCO on the 208-308 MHz VCO/Divide-By-10/Sampler Assembly (73000). The VCO is multiplied X10 and compared by a phase comparator with the output of the YIG Oscillator (69000). The oscillator output comes to the comparator through the Directional Coupler (76000) and the 3dB Power Splitter/Buffer Amplifier Assembly (74000).

4.22 The amplified output of the 2.08-3.07 GHz phase comparator goes to the YIG FM Coil Drive Assembly (27000). If the signal is within the lock range of the 208-307 MHz phase lock loop, the loop will lock. If not, the search oscillator will sweep the YIG to steer it within the lock-up range. When the 208-307 MHz phase lock loop is locked, the sampler switching circuits on the assembly will switch to the 10 MHz Sampler Assembly (72000). The YIG loop will lock to the 10 MHz Sampler output for fine tuning of the YIG frequency.

Monitor Section

4.23 In the Monitor mode (See Figure 4-5) the 0-1000 MHz input signal is received at the RF ANT input jack and routed through the RF Attenuator Assembly (51000). It goes to the 1st Converter Assembly (52000) where it is mixed with the 2.08-3.07 GHz output of the Directional Coupler Assembly (76000).

4.24 The resultant mixer frequency output of 2.08-3.07 GHz goes through a Bandpass Filter (BPF) to the 2nd Converter Assembly (53000). It is mixed with 1859.3-1869.3 MHz from the 1865 MHz Filter and Amplifier Assembly (66000) to produce a 210.7 MHz IF. The IF is mixed again with a 200 MHz reference L.O. to make the final IF frequency of 10.7 MHz. The IF frequency is sent to the 10.7 MHz IF 23000 Assembly and to the BPF Assembly (25000).

4.25 The output of the 10.7 MHz IF Assembly goes to the Detector NO. 1 Assembly (24000) where the signal is demodulated and sent to the FM/AM Detector NO. 2 Assembly (32000). The signals are conditioned and sent to the meters and CRT for display.

4.26 The 2nd Converter 10.7 MHz output goes to the BPF 25000 Assembly in SPECTRUM MONITOR Mode to set the IF bandpass of 2 kHz, 10 kHz or 100 kHz. The signal also goes to the Log Converter Assembly (26000) where it is conditioned for a Spectrum Monitor display on the CRT.

Signal Generator Section

4.27 In the Signal Generation mode, (See Figure 4-6) the RF output signal originates at the FM/AM Modulation Assembly (36000). A 10.7 MHz IF is generated and modulated by the frequency and type of modulation selected at the switches on the Tone Generator Switch Mounting/DC Power Control Assembly (12000). It is sent to the 210.7 MHz IF (62000) Assembly where it is mixed with a 200 MHz reference frequency to make the 210.7 MHz output.

4.28 The output is sent to the 210.7 MHz BPF Assembly (64000) and then to the 2.075 GHz Upconverter Assembly (65000). It is mixed with 1859.3-1869.3 MHz from the 1865 MHz Filter and Amplifier Assembly (66000). The 2.075 GHz signal then goes through a BPF to the Final Mixer/1.1 GHz LPF Assembly (75000) where it is mixed with the 2.08-3.07 GHz YIG Oscillator output from the Directional Coupler Assembly (76000).

4.29 The output of the Final Mixer/1.1 GHz LPF Assembly is the modulated 0-1000 MHz RF selected at the MHz (Frequency Select) switches. It is sent through the HI Level Amplifier Assembly (82000), to the Output Protection/Power Detector Assembly (81000). The signal passes through a 0-120dBm Step Attenuator that sets the output to the desired level. The output of the Protection Assembly goes to the Front Panel SIG GEN OUT connector.

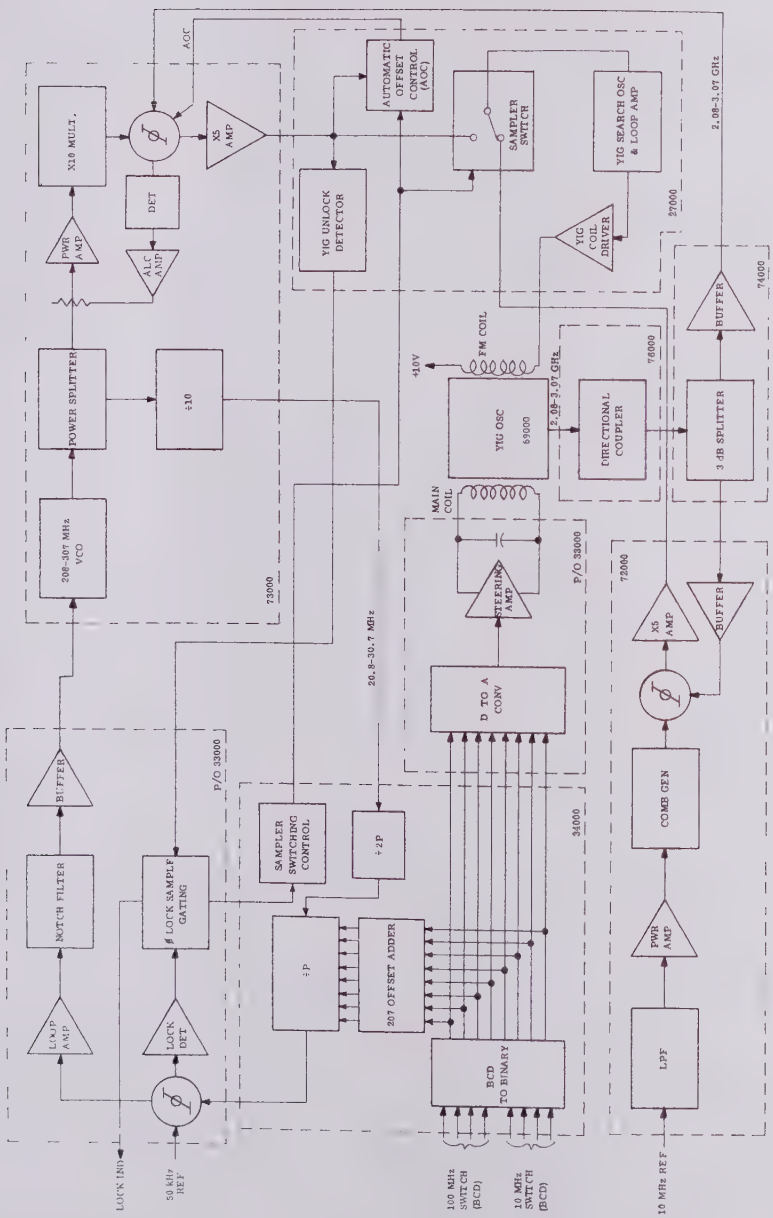
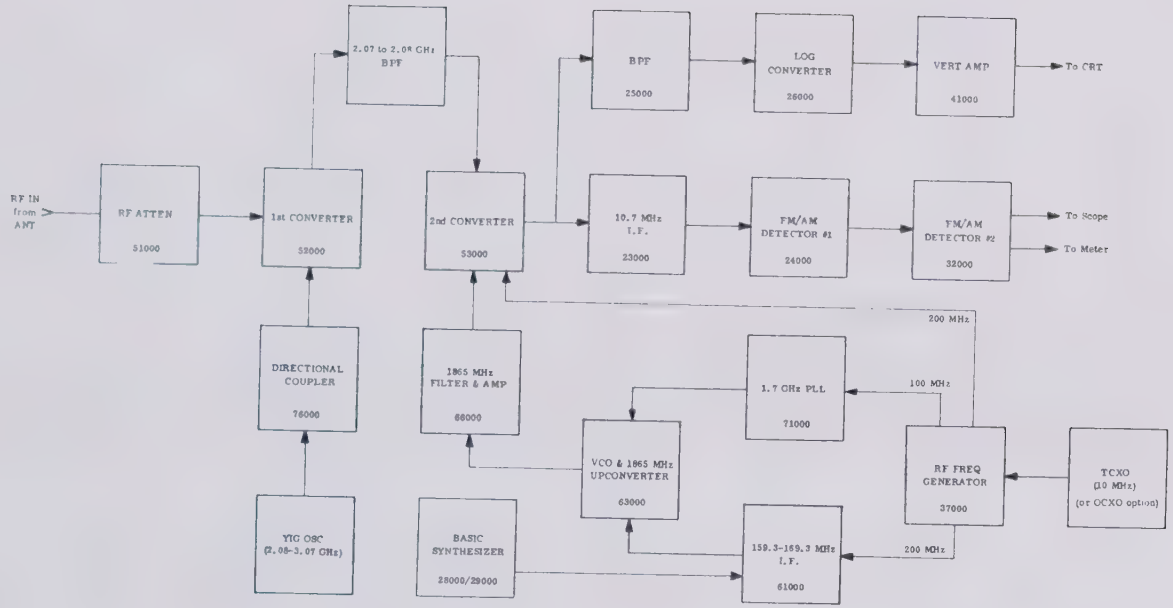


Figure 4-4. YIG Frequency Loops.



NOTES

Figure 4-5. Monitor Section Block Diagram.

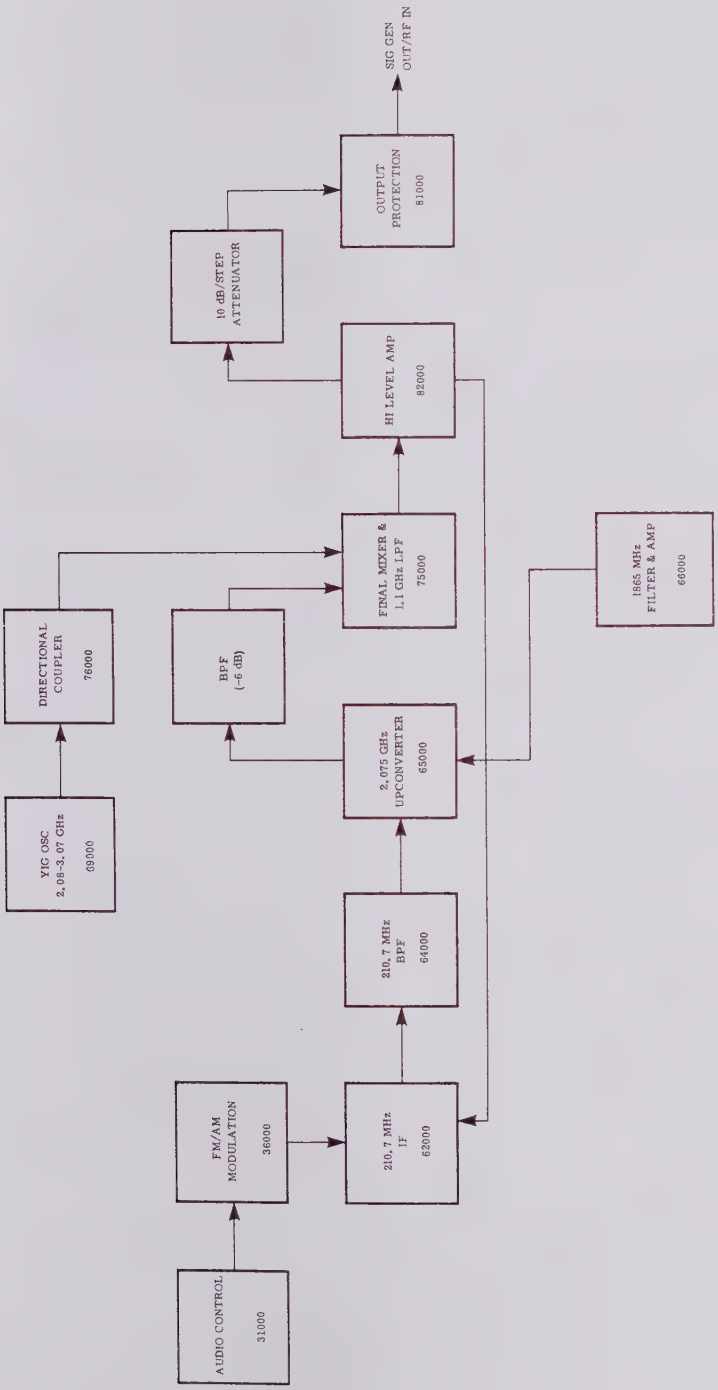


Figure 4-6. Signal Generator Section.

Audio Synthesizer

4.30 The Audio Synthesizer section generates the internal modulation and MOD OUT signals used by the unit. The MODULATION FREQUENCY (Hz) switch codes are used to generate an audio output from the Audio Synthesizer Assembly (22000). The output goes to the Audio Control Assembly (31000), the Front Panel MOD OUT connector, and FM/AM Modulation Assembly input.

Display Conversion

4.31 There are four different circuit types on the ALC/Squelch/DC Control Assembly (21000). The Power Meter Driver circuit measures input power levels. Another circuit calibrates the SIG GEN OUT level control potentiometers. The ALC receives its its input from the output of the Output Level Calibration circuit through the FINE adjust on Front Panel and uses it to hold the output level of the HI Level Amplifier 82000 Assembly to within 1dB of the output level set. The fourth circuit is the Function Monitor LED logic used in troubleshooting internal problems.

4.32 The Speaker Driver Assembly (93000) has two circuits. The first amplifies the audio frequency output to the speaker. There is also a current sensing circuit to light the OVEN LED if the optional OXCO temperature is low.

4.33 Both the Horizontal Deflection Switch Mounting Assembly (44000) and Vertical Deflection Switch Mounting Assembly (43000) serve as interfaces. They transfer information to the CRT circuits from the HORIZ (PER/DIV) and VERT deflection switches and their Vernier Calibration potentiometers.

4.34 Verticle deflection of the CRT display is done by circuits on the Vertical Amplifier Assembly (41000). The Time Base and Horizontal Amplifier Assembly (42000) controls the horizontal deflection of the CRT display.

Power Supplies

4.35 Input power (See Figure 4-7) is converted to different voltages by four PCB assemblies in the unit. The input AC supply voltage comes into the AC/DC Switching Supply NO. 1 Assembly (91000), where it is converted to +12 VDC.

4.36 THE AC/DC Switching Supply NO. 2 Assembly (92000) takes the input +12 VDC from Supply No.1, or the External DC. Here the +6 VDC and -7 VDC are developed.

4.37 The +12 VDC from the Supply No. 1, or External DC is also routed to the 10/5 V Regulators Assembly (39000).

4.38 The final power supply assembly is the DC/DC Converter Assembly (45000) which develops the high voltages for CRT deflection circuits.

Offset Generator

4.39 When the Offset Generator (OG) is turned on, the 30500 Assembly switches, causing both MONITOR and SIG GEN to function simultaneously, and the 94000 Casting produces a frequency (set by the OG (MHz) switches). The normal SIG GEN OUT to this casting and mixed with the selected frequency. The resulting harmonics (both higher and lower) are output to SIG GEN OUT/RF IN jack. Frequency synthesis and entry are performed using the 95000 through 98000 Assemblies within the 94000 Casting.

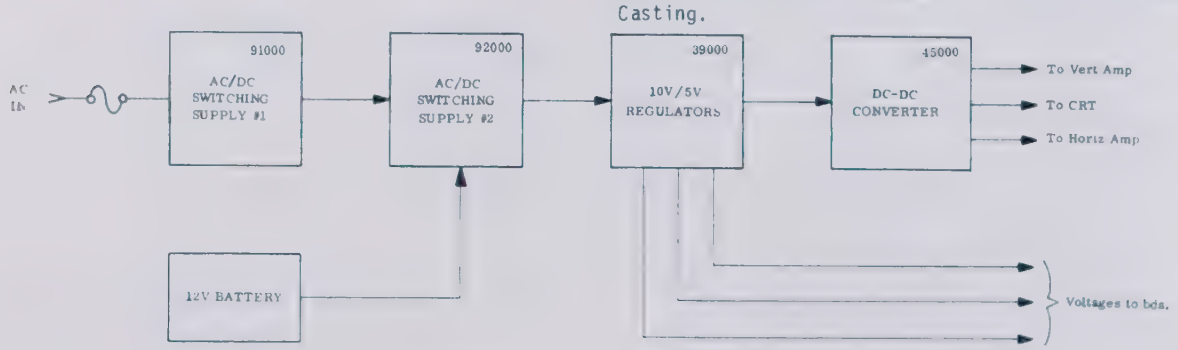


Figure 4-7. Power Supplies.

CIRCUIT CARD DESCRIPTION

4.40 Circuit Descriptions begin the with 11000 RF Select Sw Mtg., and end with the 98000 88-100 MHz VCO.

11000 RF SELECT SWITCH MOUNTING
(See Figure 6-3)

4.41 The seven MHz (Frequency Select) switches are mounted on this circuit card. Frequency position codes from these switches are transferred via traces to the edge connector. The edge connector is mounted on a flexible Printed Circuit board that transfers the codes to the other circuit cards.

12000 TONE GEN SW MTG/DC PWR CONT
(See Figure 6-5)

4.42 This assembly contains the switches used to select the audio modulation to be added to the SIG GEN output signal. It also contains the relays used to prevent meter and circuit damage from input RF levels while in SIG GEN mode. The four section FREQUENCY (Hz) switch S1 selects the numerical value of the audio tone to be generated on the Audio Synthesizer Assembly (22000). The audio tone's output value is determined by selecting a multiplier of X1.0, X0.1, or X.01 at the multiplier switch S2. The GEN/OFF/ GEN +1 kHz switch (S3) controls the RF output power even if the unit is in other than a power measurement mode. Switch Q1 will turn on and actuate the relay if the METER FUNCTION switch is in the PWR X10 (+10V to CR2), or if the input Power Detector circuit on 81000 Assembly detects an input RF signal at the RF IN/SIG GEN OUT connector on the Front Panel (diode CR4 turned on). When K1 is energized by CR4 (an input RF signal detected), the unit will automatically be placed in the PWR X10 measurement mode. If the switch is in the PWR X1 position already, and if the RF detected is less than 1 watt, the circuits will not switch to PWR X10.

4.43 Relays K2 and K3 are only activiated in the TG" mode. When the function switch is in the spectrum monitor position, +10V is applied through J2-4 to both relays R4 and CR5. If S10011 is in the detent (OFF), the base of Q2 will be grounded through S10011-3 via J3-4, holding Q2 off and the relays de-energized. K2-8 and K3-9 are connected to open relay pins. K2-9 is connected to open pin S10007- B-1 via J3-3 (+10V in SIG GEN positions), and K3-8 is grounded through K3-2. When S10011 is turned on, the +10V from J2-4 is felt on the base of Q2, turning it and both relays on.

4.44 +10V is now applied to the Front Panel fine control (S1011-1) from the K2-9/K2-16 connection, turning on the signal generator function for TG operation.

4.45 K2-8, K3-8 and K3-9 are now connected to K2-1, K3-1 and K3-16 respectively, allowing S44001F to control filter selection on the 25000 PCB Assembly.

21000 ALC/SQUELCH/DC CONTROL
(See Figure 6-7)

4.46 This assembly contains circuitry for five different functions; Unlock Detector, Power Meter Driver, Signal Level Detector for squelching, DC Level control to calibrate SIG GEN OUT, and Automatic Level Control

4.47 Any one of the four unlock detectors will cause Q1 to conduct, putting a HIGH on P1-4 to light the UNLOCK LED on the Front Panel. If an unlocked condition exists in the YIG, 208 Loop, a HIGH will be applied to P1-C, causing YIG unlock warning LED CR1 to light. This voltage is present at the base of Q1 to light the Front Panel UNLOCK LED. If an unlocked condition exists in the 1.7 GHz Loop, a HIGH comes in on P1-D to light the 1.7 GHz LED CR2 and Front Panel LED. If there is an unlock in the A and B Loop only LED CR6 will turn on with the Front Panel LED. The Loop A Divide-By-N output is present at P1-E, and through logic inverter Q3, at U2-11 clock input. Input to U2-12 is a 100 Hz reference from 35000 Assembly. When Loop A is locked both U2-11,12 inputs will be 100 Hz. The U2-9 flip-flop output will be HIGH when the Loop B Divide-By-N output frequency at P1-H equals the 100 kHz reference from 35000 at P1-F. The output of U2-5 will be HIGH to U3-1. If either loop becomes unlocked a HIGH will be output from U3-3 to delay circuit U3-4,5, CR7, R9, and C7. This will turn on LED CR6 and turn off Q2, causing Q1 to conduct. If the A and B Loop unlock is caused by one of the reference frequencies from 35000 Assembly, LED CR11 will light. The 100 Hz reference at P1-5 is routed to base of Q4 causing it to conduct. The signal is rectified by CR9, filtered by C16, and holds U3-12 HIGH. The 100 kHz reference from the 35000 Assembly is routed to the base of Q5, turning it on. The signal is rectified by CR10, filtered by C17, and holds U3-13 HIGH. If either referency frequency is lost, LED CR11 will

light, and the A and B Loop will unlock and light LED CR6 and the Front Panel UNLOCK LED.

4.48 The Power Meter Driver has two inputs. The detected power signal from the 81000 Assembly is input at P1-13 and goes to U12-3. Input at P1-9 comes from Front Panel Meter Function switch and goes to Q11 and US-12, Quad Bilateral switch. When the Meter FUNCTION switch is in any position, other than PWR X1, there is no input at P1-9; and U5 switches between pins 1 and 2, and Pins 8 and 9 are held closed by +10V on control pins U5-6 and 13. This condition connects U12-6's output through U5-9 and potentiometer R71 to U4-2 and U4-3; input is connected to potentiometer 75 through U5-2. Whenever the PWR X1 position is selected there will be +10V at P1-9, to turn on switch Q11 and changing U5 switching with +10V on U5-5,12. This opens the switches pins 1 and 2, and 8 and 9. The switches between pins 10 and 11, and pins 3 and 2 are closed. This connects the U12-6 output through R70 to U4-02 and connects voltage divider R72, R73 through U5-3,4 to U4-3. Output at U4-6 drives U1-2, through R78 and R80. Meter full scale deflection is set by R78. Meter zero in the X1 range is set by R81. The output of U1-6 through P1-N drives the two ranges of the Power Meter. The negative side (power meter return) is connected through P1-12 to P1-2 for U1 gain control and meter protection.

4.49 The Squelch signal is preset at P1-8 from 23000 Assembly. Normally LOW, it hold Q6 off so that LED CR15 will be off. This also sets P1-K HIGH, and holds the Front Panel SIGNAL LEVEL LED off. In any unlock condition the HIGH at P1-4 is routed through CR12 to relaxation oscillator U14, causing Q6 to alternate off and on; and, both signal level LED's to blink. In the SIG GEN mode, a HIGH at P-11 to U13-13 turns on Q10 setting P1-10 LOW. In Spectrum Monitor mode, +10V is applied to P1-L, P1-J turns on Q9 and closes relay K1 to send +10V out P1-M and to U13-13, which also sends a LOW TO P1-10. The +10V at P1-11 goes through CR34 to U9-7 in the ALC circuit enabling the IC to control the ALC output level warning LED, CR8.

4.50 The DC Control (or Output Level Calibration) circuit maintains a uniform RF power level at the SIG GEN OUT jack, regardless which 100 MHz range is selected by the Front Panel 100 MHz Frequency Select switch. The 1-2-4-8 code from the 100 MHz Frequency Select switch at P1018, U V, 17 is applied to BCD to Decimal (1 of 10) Decoder U6-10,13, 12,11. Each of the 10 outputs from U6 is enabled by the corresponding number selected on the 100 MHz Frequency Select switch. The DC level of each output is set by potentiometers R53-R62 so that the input at U1103 will give a controlled output from U11-6 to P1-S. Output pin P1-S goes to the FINE (OFF) control on Front Panel, a dual potentiometer, and back at P1-14 and P1-15. this DC voltage goes to U8-3, along with voltage level at U8-2 from 82000 Assembly, to produce desired output level at P1-16, to 62000 Assembly where it sets the RF level.

22000 AUDIO SYNTHESIZER

(See Figure 6-9)

4.50 The Automatic Level Control (ALC) circuit is composed of amplifiers U7, U8, and U9. QUAD Bilateral switches. The ALC level is input from the 82000 Assembly and presented to J7. The switching level of U7 is adjusted by DET ZERO potentiometer R14. The output of U7 is fed to U8 whose switching level is adjusted by the FINE control on the Front Panel. This signal is fed out at P1-16 to the 62000 Assembly as ALC OUT, and to U9. The output of U9 lights CR8 the OUTPUT LEVEL WARNING LED.

4.51 This asssembly takes the audio switch position code from the 12000 Assembly and converts it to an audio frequency for internal modulation and an audio output. The audio frequency codes from the Front Panel MODULATION-FREQUENCY (Hz) switches are input to a Decimal Rate Multiplier made up of U1 (whose input is the Most Significant Digit (MSD) of the MODULATION switches), U2, U3 and U4 (input from the Least Significant Digit (LSD) switch). A clock input to the Rate Multiplier comes from the Q1, Y1 oscillator Time Base circuit. The oscillator frequency of 5.1 MHz can be adjusted by C31 and buffered through U14 to the CLK Inputs of U1, U2, U3, U4 of the Decimal Rate Multiplier. If the MODULATION FREQUENCY (kHz) MSD switch is set to (2), the output rate of U1 would be two equally spaced pulses for every 10 input clock pulses. If the switches are set to 7, U1 would have seven equally spaced output pulses for every 10 clock pulses. Since U1-11 is tied to ground, U1 is always enabled. The multipliers are decaded, therefore the Enable Output of one is connected to the Enable and Strobe Inputs of the following multiplier (U1 o U2, U2 to U3, and U3 to U4), the clock rate at each succeeding multiplier is effectively divided by 10. The output frequency of each multiplier will be a function of the Pin-11 (E IN) Input times the switch setting (or multiplier rate)

divided by 10. With a MODULATION-FREQUENCY switch setting of 2345, 5.1 MHz times .2345 or 1,195,950 bits per second.

4.52 If the MODULATION X1.0/X0.1/X.01 switch is in the X1.0 position, the U15-8 output is gated through U15-6 and U7-6 to the U8-14 CLK input of the Up/Down counter. In the X.01 position, the U15-8 output is input to the U5-14 Divide-By-10 counter, and its U5-11 output gated through U16-8, U7-8, U15-11, and U70-6 to the U8-14 Up/Down counter input. When set to the X.01 position, the output of U15-8 goes through both Divide-By-10 counters U5, U6 and is gated from U6-11 to the U8-14 Up/Down Counter with 8 binary outputs. The up-down count is controlled by J-K flip-flop U10 which is triggered to change states at maximum or minumum counts from the 2 counters (U10-12 HIGH means count down: LOW means count up). The counter will count up and down for a total count of 255 in each direction (the full count of the 8 binary Outputs). Each cycle of output frequency requires 510 bits. For a modulation switch setting of 2345, the bit count into the up-down counters of 1,195,950 will be divided by 510 for every cycle of output frequency.

4.53 The eight binary outputs from the Up/Down counters U8, U9 are connected to the D/A Converter, U11. the D/A converter changes the linearly progressing binary input count to a linearly increasing, or decreasing (depending on the direction of the count) output current. The current increases or decreases one step for each count. This produces a triangular current waveform with a total range of 0-2 mA. One cycle of this waveform is produced for 510 input counts to the D/A converter. The D/A output is connected to operational amplifier U12. This operatinal amplifier converts the current input from the D/A Converter to a triangular wave voltage and applies it to the Sine converter. The output of U12 is biased by R22 to center the output around ground.

4.54 The Sine converter takes the U12 triangular wave and converts it into a sine wave. The FET Q2 and CR1, CR2 are the switching diodes. Adjustment for minimum distortion is made by adjusting the input level with R28 in the U12 feedback loops and with the source resistance R35. Output level to the Output Amplifier U13 is adjusted by R23. Amplifier U3 provides an output voltage at P1-14/R of 3.0V across 600 ohms. Temperature compensation for U13 is provided by thermistor R39.

23000 10.7 MHZ IF
(See Figure 6-11)

4.55 The 10.7 MHz from the 53000 Assembly is present in at P1-2/B. It is amplified and filtered to obtain a strong, undistorted signal that can be measured with precision. The 10.7 MHz is applied to amplifier Q1, Q2 through IF attenuation potentiometer R119 to set the assemblies overall gain at 80dB. The Q2 collector output goes to the 10.7 MHz parallel resonant filter circuit L3, C12, and through CR1 cathode to the 10.7 MHz filter FL1 (22 kHz bandwidth). When Front Panel SELECTIVITY switch is in the NARROW position; +10V is switched in P1-5/E and applied to CR3, CR5 turning them off, and to CR1, CR6 turning them on. This allows a path for the input signal through CR1, FL1, and CR6 to source follower Q3 and to emitter follower Q4. When the selectivity switch is in the WIDE position the P1-5/E ground potential opens a path for the 10.7 MHz around filter FL1 through CR1, CR3, CR5, and CR6 to Q3.

4.56 The emitter output is also applied to amplifier Q22, Q21. The emitter output of Q21 is detected by CR11, CR12, and the detected voltage applied to Schmitt trigger Q19, Q20. If the signal exceeds the overload level set by the Schmitt trigger, the collector of Q20 will go HIGH. This turns on switches Q18, Q23 on and Q16 off R5 into the Q1 emitter bias curcuit. When Q23 is turned on, it places attenuating resistance R87 at the Q4 output. These resistance changes effectively reduce the 10.7 MHz input signal to the IF amplifier by approximately 10dB when the input is overloaded.

24000 FM/AM DETECTOR NO. 1
(See Figure 6-13)

4.57 The purpose of Detector No. 1 Assembly is to remove the modulation from the 10.7 MHz IF input and produce outputs for display and additional processing. The 10.7 MHz comes in P1-4 from the 23000 Assembly, when FUNCTION switch is in the Monitor mode. When the FUNCTION switch is in the Signal Generator mode, 10.7 MHz comes in on P1-D from the 36000 Assembly. The 10.7 MHz is coupled to buffer Q3 and applied to CR1, which acts as a variable attenuator, and amplified through Q4, Q6, Q7. Diode bias is set by Q5, and attenuation is controlled by AGC loop amplifier U1A. The FM Path is from Q7 to Buffer Q15 and to mixer Z1. The AM path is from Q7 to amplifier Q8, Q9 to AM Detector CR2, CR3. The positive portion of the modulation is detected and buffered by U1 and output at U1-7

to three places. The final signal is filtered by R44, C34 and input to U1A-2 for AGC loop feedback. The AM Amplifier potentiometer R38 is adjusted to produce a 1V P-P signal at the DEMOD OUT jack on Front Panel. The second signal is applied to the emitter of Q10. With the Meter Function switch in the %AM mode, Q28 is turned on by the switched input from P1-E, turning on Q10 and allowing the signal output via P1-F to the 32000 Assembly to drive the 90 %AM Meter. The other AM output from U1-7 goes through switch diode CR4 if the FUNCTION switch is in AM mode and is sent via P1-7 to the 32000 Assembly for output to the scope. It is also sent to U2A-5 for DEMOD OUT jack via U2A-7 and P1-N, and to Speaker Driver (93000) via P1-M.

4.58 The 10 MHz reference signal from the 37000 Assembly P1-A and goes to amplifier Q16 and to mixer Q1. It is mixed with the 10.7 MHz from Q7 through Q15. The 700 kHz mixer output is attenuated by 3dB pad R39, R40, and R127 for impedance matching. It is filtered by lowpass Filter C38, L6, C43, and amplified by Q20, Q21; for output to three places. The 700 kHz is routed through C51 and buffer Q22 to analog switch U7-1. Another 700 kHz signal derived from a 100 kHz reference on 35000 Assembly, comes in on P1-V through amplifier Q17. It is filtered, tuned to the 7th harmonic and buffered by Q18, Q19, and is present at U7-4. Switching between the two 700 kHz signals in U7 is controlled by (Vosc + SQ) on P1-8 and Vosc + SQ on P1-J. In an automatic calibration mode Vos + SQ selects the reference 700 kHz signal from the 100 kHz X7 circuit. The Vosc + SQ signal selects 700 kHz from the 10.7 MHz IF. Selected output from U7 goes to limiter U10 with its output going to 32000 Assembly via P1-6 as SIG/CAL OUT. The third 700 kHz output goes to limiter to trigger one-short U5. The output U5-6 through P1-10 is AFC OUT TO Modulation Assembly (36000). Output U5-1 is voltage translated by Q23 to improve signal-to-noise ratio, and then goes to a switchable bandwidth lowpass filter U6 to demodulate the FM signal. When PFK is selected on FUNCTION switch P1-16, it is grounded through P10007-C9 via J300026, turning on Q25. This turns on Q24, Q26 which adds C79, C82 to switchable band lowpass filter, reducing pass band width. Demodulated audio from U6-6 is amplified through U8A-1 and sent to three places. One is out P1-M to the Speaker Driver Assembly (93000). A second output goes to the base of Q11 and U2B-2, where it is buffered, amplified, and sent to P1-14 and 32000 Assembly for processing through deviation circuits. The third output goes through an 80 kHz lowpass filter R69, C93, R70 to U2A-6. When FM or PFM mode is selected, switch Q12 will be off and switches Q13, Q14 and Q29 will be turned on. This puts U2A-5 at ground and allows FM audio input to U2A-6 to be amplified. When AM mode is selected, Q12 will turn on and ground the FM signal on U2A-6. with Q12 on Q13, Q14, and Q29 will be off, allowing the AM signal on U2A-5 to be amplified. The audio signal (FM or AM) from U2A-7 is then output at P1-N to the DEMOD OUT jack.

25000 BANDPASS FILTER
(See Figure 6-15)

4.59 The Bandpass Filter Assembly has two bandpass filters and a bypass circuit to give the needed resolution for spectrum monitor signals. The 2 kHz filter allows the resolution of signals that are close together and need to be looked at separately. The 10 kHz bandpass allows signal resolution in the intermediate range of the signal spectrum. The 100 kHz bandpass filter allows widely separated signals, to be monitored simultaneously. The Bandpass Filter input is from the Second Converter output, that also goes to the 10.7 MHz IF (23000) Assembly. The 10.7 MHz comes in at P1-17, and goes through amplifier Q1 whose gain is adjustable by potentiometer R6. The output of Q1 is buffered through Q2 to amplifier Q3, Q4. The output of Q4 is applied to diodes CR1, CR3, and CR5. The bandpass filter is determined by the position of the HORIZ (PER/DIV) switch in the SPECTRUM MONITOR positions of 10 kHz, 100 kHz, and 1 MHz. If the switch is in the 10 kHz position, the input to P1015/S will be ground, turning on CR5 and CR6. This allows the Q4 output to go through the 2 kHz bandpass filter. The 100 kHz switch position turns on CR1 and CR2. The 1 MHz position turns on the CR3, CR4 in the 100 kHz bandpass path. The output of the selected bandpass filter goes to amplifier Q7 to amplifier Q6. The output of Q6 is buffered through Q5 through P1-2/B to the Log Converter Assembly.

26000 LOG CONVERTER
(See Figure 6-17)

4.60 The Log Converter converts the 10.7 MHz analog levels to a logarithmic scale for display on the CRT in the Spectrum Monitor mode. The signal at P1-16/T goes to Q2, and common-base amplifier Q3 to provide IF amplification. Parallel resonant circuit L4, and C12 filter the signal to Q4. Buffers Q4-Q15 are used to provide the inputs needed by the U1 log converter circuit. R18 and R19, at the base of buffer Q4, provide the -30dB input

needed at U1-7, while R48, R49 further reduce the level to -60dB for U1-4. The 15dB IF Amplifier/ Limiter, Q15-Q18 provides the necessary amplification so that the signal at U1-9 is at the 0dB reference level (limited to 5 volts P-P). The emitter output of Q8 goes to Q9 through the input level control potentiometer R28. This potentiometer controls the output level of the 30dB log amplifier circuit, Q9-Q15, so the input to U1-12 will be at +30dB. The output of U1 is adjusted by setting gain control potentiometers R52, R53, R54 for the low, medium, and high level gain break points needed for the correct logarithimic output curve. The output is amplified by Q16 and Q17 and detected in CR1, CR2 log detector. The detected input drives differential amplifier U2. The GAIN potentiometer R63 adjusts the gain and signal amplitude through U2. Reference Control, potentiometer, R68 adjusts the no-signal zero reference trace on the CRT, after U2 amplifies it and outputs it to U3A. Potentiometer R78 controls the gain of U3A and is used to set the trace 10dB image. The signal is then amplified by U3B and output at P1-4/D to the Vertical Amplifier BCB Assembly (41000).

27000 YIG FM COIL DRIVER/SWEEP DRIVER
(See Figure 6-19)

4.61 The 208 Sampler input goes to FET Q21. If the Spectrum Monitor mode is selected, there will be +10V at the base of switch Q13 turning it off. This causes Q12 to be held off so that the only control to Q21 is Q14. The base of Q14 can be turned on by two inputs. The first input from the Sweep Lock Timing one-shot, U6-12, will trigger LOW for approximately 5 milliseconds. This occurs during the time the 0-6V sweep ramp from the Time Base and Horiz amplifier Assembly (42000) is LOW. As the sweep input to U5-2 goes toward +6V, the voltage will cross the R47, R48 threshold set at pin 3 and cause the noramlly HIGH U5-6 output to go LOW. The output will remain LOW until the sweep ramp reaches +6V, and then drops back to 0V. As it drops, the ramp will again cross the U5-3 threshold, and U5-6 output will rturn to its normal HIGH output state. This positive going transition of the U5-6 output will trigger the 5 millisecond sweep lock timing one-shot U6-10, causing the Q output to pulse HIGH. The Q output turns on Q14 and applies +5V to the Q21 gate. This turns on the FET switch for a 5 millisecond sampling (held by R63, C31 circuit) of the 208 Sampler input. The second input turn on Q14 to enable FET Q21 from the U7-3 Sweep Reacquire Timer output. If U7-3 goes HIGH it will turn on Q15, which turns on Q14 enabling Q21. Timer U7-3 will go HIGH if one of the inputs to U2-2,3 remains LOW after they were both LOW together. This would occur if an unlocked condition were detected by the Q1, Q3, Q4, Q5, U1 Lock Detector circuit. The unlock would cause U1-6 to go LOW, and it would be LOW as the Lock Timing one-shot U6-123 goes back to HIGH. The U2-1 output would then go LOW triggering U7-2 input, causing pin 3 to go HIGH.

4.62 The 208 Sampler input goes to swtich Q21 through the U8 buffer amplifier to FET switch Q25. In other than the Spectrum Monitor mode, this switch is closed. If the 208 Sampler is selected by the Sampler switch input from 34000 Assembly. If this signal is HIGH (208 is selected) it turns off switch Q22. Its collector will go to -5V and turn off Q23, Q24 while turning on Q26. The collector of Q26 will then apply +5V to the Q25 FET gate input, turning on the FET and passing the 208 Sampler signal. A LOW Sampler switch input would turn on Q22, Q23, Q24 while turning off Q26 and FET Q25. This enables the 10 MHz Sampler path while disabling the 208 Sampler path to the loop main amplifier and search oscillator U9. In Spectrum Monitor operation, Q22 is held off by the +10V (switch) input to its base. If during sweep time the YIG loop latches in a false lock mode, the Q6, U2 False Lock Detector circuit will cause the input of main loop amplifier and search oscillator, U9 to be pulsed HIGH, and the U9-6 output will go LOW. The signal passes through the FET sample and hold switch Q27 which is gated on by Q14 simultaneously with FET sample and hold switch Q21. It is applied to the voltage/current converting, U11, Q33 YIG FM Coil Driver circuit where it is added to the output of the YIG Sweep Driver circuit to be sent to the YIG FM Coil.

4.63 The YIG Sweep Driver circuit input comes from the Sweep In at P1-T. The 0-6V sweep input ramp goes to two transistors, Q7, Q11. Emitter follower Q7 buffers the ramp input through a voltage threshold circuit to U3-10 one-shot. When When the sweep ramp peaks and starts to fall back toward zero, it will trigger U3 as it crosses the voltage threshold and cause U3-5 to have a positive going pulse of approximately 13 milliseconds as set by R31. The output then goes to Q31 at the YIG FM Coil Driver input, turning the normally ON transistor OFF. This puts -5V to the gate of FET switch Q32, turning it off, and adds 10K resistor R100 to the C50, R99 pole to ground at U11-3 input during the time the unit is not sweeping. This reduces

the amount of jitter passed through the YIG FM Coil Driver circuit.

4.64 The threshold input to U3-10 also goes to U3-2 one-shot input. The output of this one-shot is a negative going pulse that starts at the same threshold as the other one-shot and ends approximately 5 milliseconds later as set by R34. This one-shot output at U3-4 goes to normally off switch Q9, turning it on. This puts +5V through CR2 to Q10, turning it on and allowing the 208 sampler input to go to U4-2. The U4-6 output is the result of a level comparison between the 208 Sampler input and the level at U4-3. This value will compensate for the level difference sent back to the 208 MHz Assembly (73000) sampler circuit to correct for any offset.

4.65 The Sweep In signal to Q11 emitter follower is buffered through Q11 to potentiometer R98 where it is added to the centering voltage reference output of U10. The adjustment of R98 (in 1 MHz/DIV), R107 (in 100 kHz/DIV) and R112 (in 10 kHz/DIV), set the width of the sweep selected by the input LOW signal at P1-S and P1-14/R from the Horizontal Deflection Switch Mounting Assembly (44000). The center and width controlled signal at U12-13 is amplified and converted to a current signal by U12 and Q20. This signal is used to control the YIG FM Coil frequencies for the Spectrum Monitor sweep.

28000 LOOPS A and B DIVIDE-BY-N
(See Figure 6-21)

4.66 There are two Divide-By-N circuits on this assembly Loop A and Loop B. The Divide-By-N associated with counters U1, U2, U3, U4 is used to provide the correct Loop A frequency output, while counters U13, U14, U15 are part of the Loop B Divide-By-N circuit. The purpose of each divider is to divide the output frequency of a VCO by a number determined by the setting of the Front Panel frequency select switches. This will make the divided output frequency equal to a constant reference frequency when compared in a phase detector. Each setting of the Front Panel frequency select switches changes the division number in the Divide-By-N. To keep the divided output equal to the reference, the VCO frequency must change by the correct amount to maintain a zero free error. Loop A VCO is mixed with the Loop B to obtain the correct division frequency for the Loop A Divide-By-N. While Loop B can achieve phase lock by itself, Loop A requires Loop B VCO before phase lock can be achieved.

4.67 The Loop B counters U13, U14, and U15 are preset to the 9's complement of the 297-387 Divide-By-N. The output of code converter U9, U10, U11, and U16, is derived from the 1 MHz Frequency Select switch code. If the Loop B VCO input frequency to the counters is correct, the Divide-By-N output at P1-T will be exactly 100 kHz. The Loop B VCO input frequency comes into the Divide-By-N Assembly at P1-S. The signal is amplified by clock drives Q2, and Q3, and converted to a TTL compatible signal in U12. Flip-Flop U19B is used as a Divide-By-2 that together with the Divide-By-5 portion of presettable decade counter U13 makes one of 3 Divide-By-10's in the circuit. The other two Divide-By-10's are U14 and U15. The input is divided by 10 in U13, by 100 in U14, and by 1000 in U15.

4.68 U1-6 LOW enables the pin 1 preset loading circuits on U13, U14, U15 so the output of the code converter circuits is input to the counters. When the counters are enabled the count will start from the count from the code converter circuits. The signal pulses from the preset count causes P1-T to be a pulse of three clock times duration.

4.69 The Loop A Divide-By-N circuits is similar to the Loop B circuits. Loop A doesn't require code conversion or clock delay. Its Divide-By-N frequency output is 100 Hz (when the VCO is locked) instead of 100 kHz as in Loop B. The inverted BCD code from the Front Panel Frequency Select switches is input to presettable decade counters U1, U2, U3, U4. The Loop A is buffered by Q1, converted to TTL at U8-6 and input to the first Divide-By-10, U1. The count increases from the preset count until the counters are all 9's. This 9-9-9-9 count causes U7-8 to go LOW, and applies a HIGH to U8-10. The signal at U8-9 is from the flip-flop U6-12, which will be HIGH from a count of 9 (in U4) -0-0-0-0 to 9-9-9-9. At the count of 9-9-9-9 U8-8 will go LOW, triggering both U5 one-shot multivibrators. The 100 milliseconds one-shot output, U5-9, enables U1, U2, U3, U4 preset inputs to accept the frequency switch setting code (Divide-By-N), while U5-7 is HIGH for 1 milliseconds, and is the 100 Hz Divide-By-N output to the VCO/Phase Detector assembly circuits.

29000 LOOPS A AND B VCO PHASE DETECTOR
(See Figure 6-23)

4.70 The Loop A Divide-By-N output frequency from 28000 Assembly is input to the loop phase detector at P1-6/F along with the 100 Hz reference frequency at P1-5/E. If the two frequencies are equal, the signals will be in phase, and when input to U1-5,1, will cause both flip-flops to be set simultaneously. When this happens, WAND gate U3-6 will go LOW, resetting both flip-flops. As long as these 100 Hz signals are in phase (same frequency), the U1 flip-flops will be set and reset at the same time. The Q output U1-9 passes through low leakage diode Q5 to averaging capacitor C5. The U1-13 (not Q) output goes to C5 through diode Q6. Since U1-9 is HIGH when U1-13 is LOW, the net result will be no change in the normal bias of approximately +2.5V on C5. However, if the Divide-By-N input is either higher or lower in frequency than the reference 100 Hz, the bias on C5 would be more positive or more negative. The C5 bias input is amplified in low noise operational amplifier U4. The gain of U4 is controlled by the setting of the 100 kHz Frenquency Select switch. Input P1-9 or P1-10 turns on switch Q1, which turns on Q2 gating bias and FET Q3. When Q3 is turned on it shorts across gain resistor R10 and reduces the U4 amplification. The short is removed (Q3 turned off) in the higher 100 kHz switch positions. This increases the U4 gain to compensate for the frequency roll-off caused by the Loop A Divide-By-N range of 10000-19999. The output of amplifier U4 goes through a notch filter C10, C11, C12, R12, R32, and R33 to remove the 100 Hz component from the amplified output. Additional filtering is done in the 50 Hz, 3 pole active filter, U5. The very stable DC voltage is buffered and made linear through U6 to Vericaps, CR4 and CR5. It is sent to the tuning input of Loop A VCO, Q9, where it tunes the VCO to the correct output frequency. The U6 output is also fed to voltage comparator U9. As long as the U6 output is above +0.7 VDC, the comparator will hold switch Q8 on and inhibit the 100 Hz trigger input. However, if the U6 output is below +0.7 VDC, indicating a false or incorrect lock mode, U9 will allow the trigger to be applied through Q8 to the U8 triggering input. The HIGH one-shot output is inverted by Q7 and holds U1-6 in reset (clear) for 1.1 seconds. This forces the Loop A circuit out of the false lock mode so lock can be required when the "clear" signal to U1-6 is removed. Locked to the correct 30.7000-40.6999 MHz frequency, the Loop A VCO output goes to two places. One output goes through driver Q10 and output matching circuit R49, T1, C24, L12 to the 159.3-169.3 MHz IF Assembly (61000). The other output goes through buffer Q12 to the Q15, Q16 L.O. Driver Amplifier, where it is used to drive the M1 L.O. Input port.

4.71 The RF input port on Mixer M1 is driven from the Loop B VCO output circuit. Loop B phase detector U2 operates indentically to the Loop A U1 phase detector except that the input reference frequency and Divide-By-N frequency are at 100 kHz instead of 100 Hz. The bias on averaging capacitor C37 is fed from the phase detector through diodes CR7 and CR8, and input to loop amplifier U7. This amplifier doesn't require gain switching as in Loop A. The U7-6 output is filtered by the C41-44, L4-6 Lowpass Filter. Applied to the Loop B VCO tuning diodes CR9 and CR10 to tune the Q11 29.7-38.7 MHz VCO to the correct frequency. The VCO output goes in two directions. One output goes through Q14 output driver to P1-15/S. It is sent to the Loop A and B Divide-By-N Assembly (28000) as the Loop B VCO input. The other VCO output is through Q13 mixer driver to the M1 RF input. It is mixed with the Loop A VCO output and the difference frequency of 1-2 MHz sent to the Loop A and B Divide-By-N Assembly as the Loop a VCO input.

30500 PCB SWEEPER RELAY
(See Figure 6-25)

4.72 The purpose of the PCB Sweeper Relay Assembly (30500) is to transfer control of the Y1G oscillator from the 27000 and 33000 Assemblies to the 38000 Assembly, and to inhibit the unlock LED when 1 GHz (100Hz/DIV) sweep is selected. In all switch positions, except 100MHz/DIV, K1 and K2 are energized. Main coil drive signals come from the 33000 Assembly go from P1-7 to K1-8, out K1-4, through J1-7 to the Y1G. Through J1-6 to K1-13, out K1-9 and through P1-6 to the 33000 Assembly. FM coil signals come from the 27000 Assembly through P1-12 to K2-8, out K2-4 through J1-12 to the Y1G. The return path is through J1-1 to K2-13 out K2-11 and through P1-1 to the 27000 Assembly. 100 MHz/DIV is selected by grounding J2-5 and U1-1 and 2, U1-3 and 4 are switched high. If Monitor is selected on the Front Panel +10V is applied to J2-4, through voltage divider R1 and 2 setting U1-5 high. With U1-4 and 5 high, U1-6 is set at Ground potential turning off CR3. Diodes CR3 normally supplies current through J2-7 to the unlock LED Driver on the 21000 Assembly. Grounding U1-6 also cuts off Q1 which deenergizes K1 and K2. The FM coil signal lines are opened the main coil drive lines are switched to the sweep signal input at

J2-2. The signal path is from the 38000 Assembly to K1-6, to the Y1G. The return path is from K1-11 through J2-3 to the 38000 Assembly. Diode CR2 is used to maintain proper biasing through U1-6 and CR4 to hold Q1 on when 100 MHz/DIV sweep is not in use.

31000 AUDIO CONTROL
(See Figure 6-27)

4.73 The Audio Control Assembly selects and directs the audio frequency signals to ensure that the correct audio signals are available for modulation or output as needed. The audio input from the audio Synthesizer comes onto the assembly at P1-J and is coupled through C9 to FET switch Q2. Four actions can turn off the normally on FET switch. First, if the BURST switch is not in the CONT position, the setting of the BURST potentiometer controls the timing of the U4 monostable multivibrator (1-shot) period. during the time the period is "LOW", the FET Q2 is turned off, and when "HIGH" Q2 is on. This allows the audio to pass through Q2 in "bursts" controlled by the timing of U4 and the setting of the BURST control. Second, if the BURST control is in the CONT position, pressing the INTERRUPT push-button will enable switch Q3 and interrupt the input of the audio signal. The FET Q2 is also turned off if the OFF/GEN/GEN +1 kHz switch is in the OFF position, or if the the FUNCTION switch is in the SIG GEN-PFM position. With Q2 turned on, the signal is amplified through U1A and U1B, and output from the assembly at P1-2 to be sent to the MOD ADJ potentiometer, which controls the modulation level. Also input to U1A-2 from P1-4 is the external MOD IN signal from an external modulation source.

4.74 The modulation signal returns to the assembly from the MOD ADJ control at P1-11 and is amplified through modulation amplifier U2A and input to the modulation output summation amplifier U3A-6. THe input at U3A-6 is the output of the 1 kHz amplifier U2B-1. A 1 kHz square wave is input to the Audio Control Assembly at P1-14 when U5-12 causes P1-R to enable the 1 kHz switched TTL circuits on the Reference Divider/Sinad Assembly (35000). Inverter U5-12 goes high if the OFF/GEN/GEN P1 kHz switch is in the GEN +1 kHz position. The switched TTL input goes to R32, 1 kHz adjust which sets the input level to wave shaper, Q5 and Q6 for a 1 volt P-P output sine wave. The signal goes to the 1 kHz LEVEL ADJ potentiometer on the Front Panel through P1-M. The controlled modulation level is then input at P1-L to be amplified through U2B-1 and input to U3A-6.

4.75 The modulation signal at U3A-7 consists of the sythesized audio input, or the synthesized audio plus 1 kHz. This signal goes to P1-N where it is sent to the MOD OUT connector on the Front Panel. It also goes to the inputs of FET switches Q7, Q8, and Q9 which are gated on if selected by the position of the FUNCTION switch. Potentiometer R53 (AM), R57 (FM), and R60 (PFN) are set to adjust the gain of U3B which goes through P1-9 to the FM AM Modulation (36000) Assembly circuits.

32000 FM/AM DETECTOR NO. 2
(See Figure 6-29)

4.76 The FM/AM Detector No. 2 Assembly contains circuits for meter display, automatic calibration and signal processing for other circuits. The Front Panel METER FUNCTION switch AM audio input (P1-F) and FM audio input (P1-D) are from FM/AM Detector No. 1. When %AM is selected, the AM audio input level is adjustsed by R15 and sent through R81 and C9 to halfwave rectifier input U1A-3. The FM audio input is applied to switches Q7, Q8, and Q9. Its path through the switches depends upon the deviation range selected on the METER FUNCTION switch. Potentiometers R17, R21 and R27 adjust the meter deflection for full scale at the appropriate deviation frequency. THe U2A-1 output is peak detected by U8A and 11, current limited by U8B and the DC output used to control the function meter deflection for AM or FM signals.

4.77 Separate AM Audio input (P1-9) and FM audio input (P1-8) signals are used to develop CRT deflection signals. The AM and FM audio signals are input to U7B where they are amplified and sent to the 41000 Assembly via P1-H. In FM, the signal passes through Q21 to C25 in parallel with C15 to U7B-6. FM adjust potentiometer R46 adjusts the gain of U7B to control the overall output to the scope circuits. If PFM is selected, P1-6 is grounded, turning on Q20 which turns off Q21. With Q21 off, C25 is out of the circuit. The signal to U7B-6 must now pass through C15 which decreases circuit frequency response.

4.78 The SIG/CAL OUT signal from Detector No. 1 is measured and controlled by the automatic calibration circuits. The AUTO-CAL oscillator, U1, outputs SW Driver, a 4 millisecond pulse every 400 milliseconds, at P1-P. On the Detector No. 1 Assembly, the oscillator signals select as the SIG/CAL signal either a 500 kHz reference (during the 4 millisecond calibration time) or the 700 kHz

signal IF (during the remainder of the 400 millisecond period).

4.79 SIG/CAL is input at P1-A to trigger one-shot U3. THe 50% ADJ potentiometer, R42 is adjusted to exactly balance U6 to the 2.5V reference from U9B; when the P1-A input is exactly 700 kHz to get a symmetrical meter swing. Potentiometers R74, R75 and R76 are adjusted, when selected by their respective switch (Q17, Q18 or Q19), for full scale Frequency Error meter deflection. The output of U3 is filtered by 17 kHz active lowpass filter U4. The U4-6 lowpass output is filtered again by 3 kHz lowpass R52, C26, and R54 during the 4 millisecond calibration period. After calibration, the input on switch Q4 (SW DRIVER) goes low, turning on Q4 and FET switches Q12, and Q13. This changes the lowpass to 4 kHz by adding C27 and C29 for the duration of the 400 millisecond period. The output of the lowpass is now amplified by U6 and applied to FET switch Q16 (closed only during the calibration). This is passed to sample and hold amplifier U5-2 where its average value is held in C28. Potentiometer R57 is adjusted for zero on the Frequency Error meter in the AM or CW Mode.

4.80 During the measurement period FET Q16 opens. This prevents any change in the C28 holding voltage as long as the input to U6-3 is equal to it. If there is a frequency error, C28's voltage will be either higher or lower than U6-3. This causes the current at U6-3 to change and the amplifier +2.5V output will be changed by an amount directly related to the frequency difference. The output is applied to another sample and hold FET switch Q14, which is controlled by the SW DRIVER and Squelch signals to Q4, Q5, Q6 and C30. This circuit smoothes out the U6-6 output changes by averaging the sampled voltage changes. The output is then buffered through U7A to the Frequency Error Meter.

32000 FM/AM DETECTOR No. 2 (OP-04)
(See Figure 6-31)

4.81 Audio inputs from the 24000 Assembly are controlled by the Meter function switch in the %AM position. The signal comes in P1-F to U2A-3, R15 is used to calibrate this signal level. In the FM positions, the signal comes in P1-D and is switched through Q7. The signal on P1-5 goes to Q8, the signal on P1-E to Q9, and the signal on P1-4 to U2A-3. These signals are calibrated by potentiometer R17 for the 15K, R21 for the 5K, and R27 for the 1.5K deviation ranges. The signal is buffered through U2A to U8A which with Q11 form a peak detector. The on board +5V regulator is ferved by U2B and Q10. Current limitter U8B's output goes to P1-2, through the meter function switch to the meter deflection positive terminal.

33000 YIG MAIN COIL DRIVER
(See Figure 6-33)

4.82 The binary coded output of the 100 kHz and 10 MHz switches is taken from 34000 Assembly and applied to the Digital to Analog (D to A) converter U8 in the YIG Main Coil Driver circuit. The output of the D to A is input to operational amplifier U9. Potentiometer R58 is used to set the input current level to U9 when the 100 MHz and 1 MHz switches are at 00. R51 adjusts the output current change (gain) from 00-99, with a maximum setting at 99. The ouput of U9-6 then goes through output driver Q6 to the YIG main coil.

4.83 The 208 phase lock input is the Divide-By-2p (50 kHz) from the 34000 Assembly and the 50 kHz from the 35000 Assembly, going to U1, pins 4, 5, 9, and 10. The inputs are applied to phase comparator U2-1,2,3. If the Divide-By-2P and reference signals are the same phase (frequencies are equal), the U2-2,13 outputs will both remain high. If the Divide-By-2P input lags in phase to the U2-1 reference frequency, it will cause the U2-13 output to go LOW while U2-2 remains HIGH. The U2-2,13 outputs are applied through switches Q1 and Q2 to pulse averaging capacitors C14 and 15, which average the U2 output pulse to a DC value to be applied to U4 loop amplifier. The U4 output will go above or below its reference output depending on the phase of the U2 input signals. The U4-6 output is filtered by C-25, C-32, R19, and R22-R24 50 kHz notch filter. The Notch Filter removes the input frequency components and assures a constant DC voltage output through buffer Q3 to the 208-307 MHz VCO/Divide-By-10/Sampler Assembly (73000) for VCO tuning. The U2-2,13 outputs also go to the U1 lock detect state which will have a "LOW" output at pin 3 if the loop is locked. If the loop is unlocked, the U1-3 output will pulse HIGH more and more often, depending on how far the Divide-By-2P frequency is from the 50 kHz reference. The averaging capactor will have a more and more positive charge until U3-6 exceeds the threshold set by R21 at the U6 threshold detector input. If the 208-307 MHz VCO is unlocked, and the phase lock switching is enabled at the 34000 Assembly, or if the YIG has become unlocked, the output of U7-8 will be HIGH and enable the phase lock switching pulse output at

P1-6 to the 34000 Assembly. Switches Q4 and Q5 enable troubleshooting LED's on the 21000 Assembly.

34000 DIGIT DECODE/DIVIDE-BY-P
(See Figure 6-35)

4.84 The Digit Decode/Divide-By-P and Assembly works in conjunction with the 100 MHz Front Panel Frequency Select switches and the Divide-By-10 output of the 208-308 VCO/Divide-By-10 Assembly (73000). The frequency codes from the 10 MHz switch (P1-H, J, 5, 6) are input with the BCD to binary coded output of U8 and U9 to adders U10 and U11. It is added with a 9's complement preset code of 2 (in the U10 100's adder) and 8 (in the U11 10's adder) for a total preset of a 9's complement 208. This preset is added with the binary switch code so the output is a code of 208-308, depending on the setting of the 10 MHz and 100 MHz switches. The counter input of 208-308 is the Divide-By-P. The 208-308 MHz VCO input to the circuit is Divided-By 10, divided again by 2, and input at P1-10 as a 10,4-15.35 MHz frequency. This is input through driver U5-4 to the U12 and U13 counters' clock input. The UP/DOWN enable inputs to U12 and U13 are held "HIGH" by U5-12, so the counters will only count down. When the Divide-By-P clock input to U12 and U13 has counted down to 0-3 (U12-2, 3, 6, 7 outputs are all zero, and U13-6 and 7 are zero), and there is no carry input from adder U10, gate U14-6 will go HIGH. At the next clock count (0-2), flip-flop U7 will be set. At U12 and U13 count 0-1, U7-11 output will be enabled, so that at count 0-0 the U12 and U13 LD Input pin 11 will be LOW. This enables loading of the adder inputs to the counters. If the combination of binary input and 208 offset in the adders causes U10 to generate an overload, or carry (pin 14 HIGH), output U7-14 will inhibit an output from U14-6 until the counters have counted down the carry.

4.85 Also on the Digit Decode/Divide-By-P Assembly are some components of the sampler switching control circuits. Input to the circcuit is the phase lock switch pulse at P1-S from the YIG Main Coil Driver Assembly (33000). This normally LOW Input will go HIGH if the YIG or 208-308 MHz VCO loop is unlocked. This HIGH input to U2-9 sets the one-shot for 300 milliseconds during which time the loop is allowed to lock. At the end of the 300 millisecond lock period, the output of U4-3 will go LOW. This sends a LOW switching signal to the YIG FM Coil Driver Assembly (27000) to switch the FM coil driver to the 10 MHz Sampler output. It will also send a HIGH signal to P1-N to light the YIG UNLOCK indicator and to set the U1-9 one-shot KICK oscillator. The KICK one-shot sends a 5 millisecond pulse to cause it to start searching from the high end of the tuning voltage range.

35000 REF FREQ DIVIDER/SINAD
(See Figure 6-37)

4.86 The input to the Reference Frequency Divider circuits is 10 MHz at P1-13, P. The 10 MHz is amplified by buffer Q1 and converted to a TTL compatible square wave at U1 pin 3. The output of U1 pin 6 is reinverted (to original phase) for input to the U2 Divide-By-10 circuit. The 1 MHz output of U2 pin 12, goes to Divide-By-10 U3. The 100 kHz output of U3 pin 12 goes to buffer U4, whose pin 6 output goes to P1-L and pin 3 output to P1-N, 11 for distribution to other PC boards. The 100 kHz also goes to the buffer inverter U4 pin 12 and 13. Inverter ouput U4 pin 8 reestablishes the original phase of the signal for input to the ÷2 input of U5, pin 14. The 50 kHz output of U5 pin 12 is buffered by the double inverter U6, whose pin 8 ouput goes to P1-10 for distribution of the signal to other PC boards. The 50 kHz output also goes to the double inverter U6 pin 1, 2 whose pin 6 output is the 50 kHz input to the U5 pin 1 Divide-By-5 section. This gives a 10 kHz output at U5 pin 11 for input to Divide-By-10 U7 pin 1. The 1 kHz output at U7 pin 12 goes to buffer U8 pin 12, 13 whose pin 3 output is sent to P1-7, H for distribution to other PC boards. The 1 kHz also goes to buffer U8 pin 9, 10. The U8 pin 6 buffer output drives the 1 kHz Divide-By-10, U9 which has an output at pin 11 of 100 Hz going to P1-8, J.

4.87 The SINAD circuits input signal comes in at P1-3, C from the Front Panel SINAD IN jack. The input consists of the required 1 kHz tone output of the receiver being tested, plus all additional frequencies of noise harmonics, and other distorting signals generated in the receiver. This composite signal of 1 kHz tone, noise and distortion goes to pin 2 of dual operational amplifier U10. The circuits are divided into three sections; AGC, 1 kHz Notch, and Meter Drive.

4.88 V10 is an Operational Translator Amplifier (OTA) used in conjunction with High Performance Operational Amplifier U11. The two amplifiers are connected in casca de so that the output at pin 7 drives the input at pin 3 of U10 and U11. This provides greater amplification and stability.

The circuit at U10-5 biased by the feedback from U12, a BIMOS Operational Amplifier. The ouput of U11 is presented through a divider network and feedback control potentimeter R29, to amplifier U13. Amplifier U13, and the divider network form a 1 kHz Notch Filter. The output at U11 pin 1 is a constant level composite signal of 1 kHz, with components of receiver noise and distortion. It is applied to the 1 kHz Notch Filter, where the signal is removed, leaving only noise and distortion. This filtered signal is presented to a Meter Drive circuit composed of U14 and Q2. In addition, the ouput at U11-1 is returned as feedback through U14 a JFET, Input Operational Amplifier and U12.

4.89 The noise and distortion components are amplified and rectified through U14 and Q2. The resultant signal is viewed on the SINAD through P1-4/D and 5/E.

36000 FM/AM MODULATION
(See Figure 6-39)

4.90 This assembly inserts audio modulating frequency into the RF being generated in SIG GEN mode. The circuits are operated by +10V available at P1-14/R only in the SIG GEN Mode in certain positions of the FUNCTION switch. Those positions control switches Q1 (AM select at P1-E), and Q2, Q3, and Q4 (FM, PFM select at P1-N).

4.91 When the FUNCTION switch is in the SIG GEN-AM or CW positions; the circuits powered by voltages +10V and +10V (FM), and a 10V (AM) are turned on and the +10V (FM) powered circuits turned off. The 100 kHz reference input at P1-P is amplified through Q5 and the seventh harmonic 700 kHz is extracted by the tuned bandpass filter C13-C18, L2, L3, and L4. The 700 kHz output is buffered through Q7 and amplified by Q8-Q10 to be input to the M1 mixer LO input. It is mixed with 10 MHz from P1-8 (amplified through Q6). The 10.7 MHz summed frequency output of K1 is amplified by Q14 and sent through the bandpass filters F1 and F2. It is amplified by Q15 and Q16 and buffered by Q18 to switch Q17 (Q13 FM switch is off). The signal is then buffered through Q19 to the AM modulator U3 where it becomes the carrier signal for audio modulation frequency. The audio frequency input comes in at P1-M. If the FUNCTION switch is in the SIG GEN-AM a practice voltage is turned on at P1-E to the AM modulator U3-4 input. The AM ADJ potentiometer R82 is adjusted to give 100% amplitude modulation.

4.92 When the FUNCTION SWITCH IS IN THE SIG GEN-FM or PFM the circuits powered by voltages to +10V and +10V (FM) are turned on while all others are turned off. The AFC input from the 24000 Assembly comes in at P1-D. It is filtered by Lowpass Filter R16 and C44, buffered by U1, and then filtered again by the 200 kHz lowpass filter made up of C50, C53, C55-C57, L6, and L8. The output of the 200 kHz lowpass is then summed into U2-2 with the FM CAL (OFFSET) potentiometer level. The OFFSET potentiometer R24 is adjusted to give the Front Panel FM CAL (OFFSET) control a frequency range of +15 kHz about the 10.7 MHz carrier. The modulating audio frequency at P1-K is switched through CR7-CR9 to amplifier Q21. The collector output of Q21 goes to U2-2 where it is summed with the FM CAL (OFFSET) potentiometer input and AFC input. The looped summing amplifier U2 drives CR4 and CR5 tuning input to the 10.7 MHz VCO. The output of the VCO is an FM modulated and frequency controlled 10.7 MHz carrier signal that can be offset from the selected center frequency by $\pm$ 15 kHz. This signal is buffered through Q12 and switched through Q13 to Q19 (Q17 being off), which buffers it into the U3 AM modulator to become the carrier signal. The Q19 output to U3 is the modulated 10.7 kHz carrier whose level is adjustable by R111. The output is buffered through Q24 and Q25, and filtered through lowpass filter C76-C80, L16, and L17 to P1-L. The lowpass output is also buffered through Q26 to P1-H.

37000 REF FREQUENCY GENERATOR
(See Figure 6-41)

4.93 The TCXO supplies a reference 10 MHz to the 37000 PCB through the 52 cable to J1 where it is split between Q1 and Q8. Q8 buffers the 10 MHz signal which is sent to the following four places:

* The 10 MHz detector, U2-11. If the input signal is below the level set by the divider network at U2- 10, U2-13 will go high, turning on LED CR3 (10 MHz reference LED),

* Q9 to be buffered for output to the 24000 PCB Assembly via P1-9/K

* Q10 for output to the 35000 Assembly via P1-9/K.

* Q11 for output to the 36000 PCB Assembly via Q10 for output to the 35000 Assembly via P1-10/L. The other half of the J1

input is buffered through Q1 to limiter circuit Q2, Q3. Through U1 to the base of Q4, the first of four stages (Q4, Q5, Q6, Q7) tuned (by L5, L6, L7, L8) to the fifth harmonic of the input signal or 50 MHz. The 50 MHz off the collector of Q7 is split between the bases of Q12 and Q16.

4.94 The Q12-Q15, L10-L13 circuit functions the same as the Q4-Q7, L5-L8 circuit. It is tuned to the second harmonic of the 50 MHz reference signal. This reference is applied to U2-7. If it is below the level set at U2-6, U2-1 will turn on CR5 (100 KHz reference LED). The 100 MHz reference is then routed to the 71000 PCB Assembly via J3 and the R cable at a level of +2dBm ±1dB

4.95 The Q16-Q15, L16-L19 circuit which receives the other half of Q7's 50 MHz output is tuned to the fourth harmonic or 200 MHz. The 200 MHz signal from the collector of Q19 is split into the following four places:

* A 200 MHz Detector U2-9. If the Signal Level drops below the reference level set at U2-8, U2-14 goes high, turning on CR7 (200 MHz reference LED).

* The 58000 PCB Assembly via J2 and the Q cable, at +3dBm ±1dBm.

* The 63000 PCB Assembly via J4 and the S cable, at 0dBm ±1dB and 4) (CE-50-1, and /TG" only).

* The CAL OUT jack on the Front Panel via P1-1/A and the 54 cable, at -20dBm ±1dB.

38000 SSB/ZERO BEAT/SWEEP DRIVER
(See Figure 6-43)

4.96 The Single Side Band/Beat Frequency Oscillator Assembly (SSB/BFO) has two basic sections, a 700 kHz reference circuit, and the SSB audio circuits. The 700 kHz reference circuit begins with a 100 kHz reference fequency input at P1-14/R, and amplified by Q1 to drive harmonic generator L1, C3, and C4. Filter C5-C8, L2, L3, selects the seventh harmonic (700 kHz) to be amplified by Q2 and Q3, for input to buffers Q11 and Q4. The Q11 output through P1-9/K is sent to the scope for display. The Q4 buffered output is amplified by Q5 as an input to the balanced mixer at BM1-1. The other input is 700 kHz IF from the buffer, Q6 and Q7. The output of the mixer is fed through the SSB Audio Circuit Q8 to Q9, and Audio Switch. The signal is present at P1-2/B as AUDIO OUT.

4.97 ±10V for the assembly is input through P1-13/P from the ±10V MECCA, filtered and routed off the assembly through P1-12/N to the SSB/BFO switch on the Front Panel. When the SSB/BFO switch is turned on, the ±10V is routed back to the assembly through P1-11/M, and distributed across the assembly as needed.

4.98 The Main Coil Sweeper is composed of amplifiers U1 and U2, Q12 and Q13. Potentiometer R38 adjusts the balance while R41 adjusts the gain.

39000 10V/5V REGULATORS
(See Figure 6-45)

4.99 This assembly contains the circuits which provide the +10V, +5V, and -5V mecca power sources, and also the -2V and battery condition monitoring circuits.

4.100 The input voltage used to produce the +10V mecca power source is ±12 VDC from the Front Panel POWER (STD BY/ON/OFF) switch. When it is in the ON Position, and the other POWER (EXT DC/BATTERY/AC) switch is in the position from which the power source is to be derived, +12V comes onto the assembly at P1-1/A. It is filtered through L1, C1 and sent to the Rear Panel series pass transistor Q90001 through P1-2/B. Initial regulator turn-on start and IC bias isolation is provided by Q1, Q2. Current regulation of Q90001 output by U1 is used to control the voltage. A precision, temperature compensated zener reference input is provided for U1 by CR11. Voltage fluctuations at the +10V mecca are felt at the U1-2 inverting input through resistance divider R12-R15, R17, and R13 the +10V adjust. The output of U106 is amplified and inverted through Q3 and Q4, and used to control the base bias of Q90001. If the +10V mecca voltage tries to decrease, the base bias is increased to allow more current through the series pass regulator Q90r01.

4.101 The +5V mecca power source is produced from a pre-regulated +6V input at P1-15 from the 92000 Assembly. The input is filtered through L2, C7 and sent through P10L to the Q90002 series pass regulator on the Rear Panel. The regulator return is at P1-K. The +5V source is regulated by controlling the emitter to base bias to Q90002 and is done by the circuits of Q4, Q6 and voltage compara-

tor U3. The +5V mecca source is monitored at U3-2 and compared with +5V derived across divider R31 and R32 from the previously regulated +10V MECCA source. Any fluctuation in the +5V output is amplified and inverted across Q5 and Q6. The fluctuation is eliminated by increasing or decreasing the emitter to base bias of Q90002 as needed. The differential amplifier U2 monitors the current through R25 by checking its voltage drop. If the current is too high, the U2-6 output will go LOW, turning off Q5 and Q6 emitter-base bias control to Q9002 and turning off Q90002. This is "fold-back protection". As the current increase through the +5V source circuit it becomes too high, and U2 begins to reduce it, or fold it back. As more current is needed, less is supplied through the circuit. Additional protection for the circuit is given by the overvoltage protection circuit of Q90003. Normally off, Q90003 will conduct only when the +5V output voltage exceeds the level set by CR9 zener value. When CR9 conducts, it draws current through R33. If the voltage drop across R33 exceeds the Q90003 emitter-base turn-on bais, the transistor will conduct and turn off the +5V output.

4.102 The input voltage for the -5V and -2V regulator circuits also comes from the 92000 Assembly. The -7V regulated input at P1-9 goes to the series pass regulator Q7. The conduction of Q7 is controlled by its emitter-base bias, which is set by the voltage comparator Q8 and Q9. The base voltage of Q9 will be equal to the base voltage of Q8 (zero volts) if the output of the series pass regulator Q7 is -5V. When the Q7 output goes more positive than -5V, the conduction of Q9 decreases. This decreases the voltage drop across R35 making the emitter of Q8 more positive. The increased forward bias on Q8 causes it to conduct more and increase the conduction of Q7, which makes the Q7 output more negative. This cancels the output attempt to go more positive. The -2V output is derived from the -5V regulated output, and regulated by Q10.

41000 VERTICAL AMPLIFIER
(See Figure 6-48)

4.103 This assembly contains circuits for amplifying and converting the selected input signal to the voltage levels needed to transform the signal characteristics for display.

4.104 The signal input comes onto the assembly at J1-8 (demodulated AM or FM from 32000 Assembly for normal oscilloscope operation) or at J1-6 (from 26000 Assembly for Spectrum Monitor operation in CE-46A). For normal operation the signal gain is set by R59 and its offset level controlled by R61. The signal is then sent to J4-8. The signal is acted on through 43000 Assembly switching and then returned to 41000 Assembly through J4-1 to the gate of one of the dual FET amplifier of Q2. Dual FET Q2 plus Q1, Q3, Q4, and Q5 make a low noise, high input impedance, dual differential feedback amplifier. The input FET of Q2, Q1, and Q4 make up the first differential feedback amplifier. Its output at Q1 is sent to differential amplifier Q6 and Q7. The second Q2 FET gate is biased through voltage divider R14, R15 and BAL potentiometer R71, and its output taken from the collector of Q3 to the base of Q7. The BAL adjust R71 is adjusted to prevent changes in the R10 VERT CRT position pot from causing a DC level shift in the amplifier output. The differential output of Q6, Q7 goes through J2-4 and J2-9 to 44000 Assembly. If the HORIZ (PER/DIV) switch is not in pone of the SPECTRUM MONITOR positions, the signal is returned through J2-6 and J2-7 to the base inputs of Q8 and Q16 amplifier which is cascaded with the Q11 and Q14 differential amplifier, using CR10-CR12 as a current source. The Q11 and Q14 differential amplifier is used to drive the Q9, Q10, Q12, and Q13 current sinking network, which powers the Q8 and Q16 collector differential output. Increased current requirements of higher frequencies are met by using C11 and C15 to short across Q9, Q10, Q12, and Q13 at higher frequencies. This reduces the transistors current gating effects and makes more current available to meet the increased speed requirements. The output of the deflection amplifier goes to J3-2 and J3-1 where it drives the CRT vertical deflection plates.

4.105 In Spectrum Monitor operation the input signal comes in at J1-6 from the 26000 Assembly. The HORIZ (PER/DIV) switch is in one of the SPECTRUM MONITOR positions. This causes the deflection amplifier Q16 base to be grounded (J2-7 to J2-8), and the base of Q8 to be connected (from J2-6 to J2-2) through R45 to the J1-6 input. It also connects the GAIN (R49) and VERT SHIFT (R47) potentiometers to the deflection amplifier input to control the input signal amplitude and offset during spectrum monitoring. This causes the vertical amplifier circuits to be by-passed during spectrum monitor operation so that only the deflection amplifier and CRT display control circuits are used. Astigmatism control R54 is set to assure good focus of the trace at either end of the CRT. The Trace Rotate

potentiometer R62 allows the trace to be rotated without moving the CRT itself. The XPOS potentiometer is a centering control for the CRT display and the INTENSITY (R66) and FOCUS (R67) controls are set to make the CRT display readable.

42000 TIME BASE AND HORIZONTAL AMPLIFIER
(See Figure 6-50).

4.106 Time Base section consits of U1, U2 and Q1-Q15, plus all associated circuitry including timing capacitors C1-C4 on the 44000 Assembly. It's function is to synchronize the horizontal sweep rate (in both normal and spectrum monitor modes) to the input signal, and generate the correct sweep range for each selected sweep speed. The Horizontal Amplifier section amplifies the sweep to a level which can be used to drive the CRT deflection plates, and control the intensity of the display.

4.107 The signal from the 43000 Assembly is is input at J2-8 and applied to the base of buffer Q1. Potentiometer R1 adjusts the balance for the trigger circuit. The output of Q1 is sent to differential pair amplifier U1-10 , amplified through U1, buffered through emitter-follower Q3, and sent to the U2-3 Clock 1 input. The +5V Vcc for U2 and other circuits is provided by the Q2 +5V regulator circuit. The Q3 output goes through C11 to Q4 and Q5 Preset Trigger pulse detector circuit. The Q4 and Q5 output, through CR4, is the threshold detect feeding U2-4 the Trigger Flip-Flop. The free-run preset enable through CR7 presets U2-5 output HIGH when there is no trigger input. The free-run disable signal through CR13 (for spectrum monitor operation) originates in the Blanking Control logic.

4.108 The operation of Dual D Flip-Flop,U2, sets the timing for the oscilloscope horizontal sweep. A trigger input is detected by Q4 and Q5 and output through CR4 as a positive pulse. This pulse is applied to U2-4, and disables the preset hold which places the circuit in a free-run condition. The pulse is output from Q3 and applied to the Clock 1 input at U2-3. Flip-Flop U2-5, which has been preset HIGH, stays set; and the LOW at U2-6 holds the ramp reset switch Q12 off. With Q12 off the oscilloscope ramp generator current source Q7 will be turned on. This will charge the holding capacitor selected by the Horizontal Deflection Switch MTG sections A and B. As these capacitors charge, the ramp output of Q12-Q14 ramp generator goes more positive. This turns on Q8 and removes the preset hold from U2-10 without resetting it. The ramp will go more positive until it crosses the threshold set at the base of Q9 by R45 and R48. When this threshold is crossed, Q9 will conduct, resetting the U2-9 output LOW. This LOW enables the U2-1 clear input, resets U2-5 to a LOW, and U2-6 HIGH (possible now because the U2-4 preset hold was removed by the Q4 and Q5 detected trigger pulse). The U2-6 HIGH turns on Q12 and discharges the selected holding capacitor, resetting the ramp to its low starting level. This LOW ramp voltage then turns off Q9 and Q8, enabling the U2-10 Preset (setting U2-9 HIGH), and disabling the U2-13 Clear input. The Q4 and Q5 detector output now returns to its normal LOW and the timing flip-flop is ready for another trigger input.

4.109 When the HORIZ (PER/DIV) switch is in one of the spectrum monitor positions, the switch section E on 44000 Assembly applies a switched +10V to the CR13 input to U2-4 Preset and to switches Q18, Q10, Q28. The Q10 switch disables the squelch blanking circuits. Switch Q28 base is enabled by the sweep trigger input (through the forward biased diodes CR31-CR33 from the 27000 Assembly at J3-1. The sweep trigger is a normally LOW input with positive going sweep trigger pulse. Switched through Q28, the input to U20-3 is a normally HIGH signal with a LOW going pulse. The switched +10V through CR13 holds the U2-4 Preset input HIGH so the U2-5 output is set by the input sweep trigger pulse. When the trigger from J3-1 sets U2-5 HIGH, then U2-6 goes LOW and holds the ramp reset switch Q12 off. The current source for the spectrum monitor sweep is Q6, which now starts charging the C10 spectrum monitor current holding cap. The Q6 collector output is switched through the 44000 Assembly section B to the input to the ramp generator Q13, Q14. As C10 charges, the ramp output of Q13, Q15 becomes more positive, turning on Q8. With Q8 turned on, the input to U2-10 Preset goes HIGH, disabling the preset hold on U2-9 output. When the ramp exceeds the threshold at the base of Q9 set by R45, R48, then Q9 will conduct, resetting the U2-9 output to a LOW. This LOW enables the U2-1 Clear input and resets U2-5 LOW and U2-6 HIGH. The HIGH at U2-6 turns on Q12 and discharges C10, resetting resetting the ramp to its LOW starting level. The low ramp voltage turns off Q8, Q9 and presets U2-9 HIGH again. The timing circuits are then ready for another spectrum monitor sweep trigger input at J3-1.

4.110 The ramp output of Q13 and Q14 goes to the junction of R56 and R57. In all positions of

the HORIZ (PER/DIV) switch other than spectrum monitor, switch Q15 shorts out R59, and Trace Width potentiometer R58 alone sets the base bias to the horizontal amplifier Q19 input. In the spectrum monitor mode R59 is in the circuit. External input signals used to control the horizontal sweep are input to the assembly at J4-1 from the Front Panel. The signals are amplified through Q16 and Q17 and switched through 44000 Assembly to the Q19 horizontal amplifier input. The R76 setting determines the horizontal sweep ramp signal amplification through the cascaded differential amplifier Q19, Q20, Q21, and Q23; while Q22 provides the Constant Current source. The differential output is adjusted for balance by R87 in the spectrum monitor mode (the FET Q24 is turned on by switch Q18), and output through J7 to the CRI horizontal deflection plates. Amplifiers Q25, Q26, and Q27 control the voltage differential between the CRT cathode and grid 11 at J5 pins 1 and 2. The intensity of the CRT display is set by R96.

43000 VERTICAL DEFLECTION SWITCH MTG
(See Figure 6-52)

4.111 This is a swtich mounting and interface assembly for the four deck VERT switch S1 and its concentric CAL potentiometer vernier adjustment S2/R1. The S1 switch sections are drawn in the 1.5 kHz/%AM/X10 position as viewed from the front. The vernier adjustment R1 will vary the signal amplitude on the CRT only during oscilloscope operation. Q1 is a switchable amplifier used only in the EXT (PER/DIV) 5MV range.

44000 HORIZTONAL DEFLECTION SWITCH MTG
(See Figure 6-54)

4.112 This is a switch mounting and interface assembly for the eight deck HORIZ (PER/DIV) switch S1 and its concentric CAL vernier adjustment S2/R3. The S1 switch sections are drawn in the 10 millisecond position as viewed from the front. Four separate connectors are used to connect the switch position data to appropriate circuits. The vernier R3 scan width adjustment is functional only during oscilloscope operation. K1 is used in the CE-5110 to switch from the 10dB/DIV to 1dB/DIV display.

45000 DC/DC CONVERTER
(See Figure 6-56)

4.113 This assembly converts an input +10 VDC to DC voltage levels needed to operate the CRT circuits. The +10V comes in at J2-3 and is filtered by C1 before being applied through R1 and L1 to transformer T1 pins 5 and 14. Resistor R1 is a current limit for T1 pins 3,4, and 5 lower primary winding. L1 is current feed control for the circuit. The input +10V to T1 pins 1,2, and 14 upper primary winding stores current in L1 to be used when the output load requires it. This reduces output fluctuations by having an available current source for short-term loading demands.

4.114 The +10V input is felt at the base of both Q1 and Q2. Due to normal transistor differences, one will begin to conduct before the other, and for purposes of this explanation, it is assumed to be Q1. As Q1 begins conducting, it pulls current through L1, from pin 14 through the primary winding to pin 1, and then through Q1. The current through the upper primary winding induces an opposite flow of current in the lower primary winding from pin 4 to pin 3. This makes pin 4 more positive and turns on Q1 harder. Since pin 3 is the more negative Q2 is held off. The conduction of Q1 will increase until the field in the upper primary of T1 reaches the maximum voltage of the input. At this point, since the input to the primaries is a DC voltage, the field will start to collapse. The current through the upper primary winding will now reverse, going from pin 14 through pim 2, and through Q2. The induced current will cause pin 4 to change from positive to negative and pin 3 from negative to positive. The bias on Q1 will decrease and on Q2 will increase, until Q1 turns off and Q2 turns on. The operation of switch Q2 is similar to Q1, except that the direction of current flow through the transformer is reversed. Switches Q1 and Q2 will alternately switch on and off at the natural oscillating frequency of the circuit.

4.115 The four secondaries provide the voltages for CRT operation. The addition of C2, C3, C4, and C5; in conjuction with the transformer windings, places a tank circuit in the T1 primary (C4 and C5 are reflected back by transformer action). This stabilizes the natural oscillating frequency and the transformer operation. The The secondary winding at terminals 8,9 and 10 works with CR1 and CR2 to make a full wave negative rectifier. The output is filtered by L2 and C9 and the resulting -10V output sent to J1-1. The secondary winding from terminal 6 to 7 (center-tapped to ground at terminal 9) and CR3, CR4 make a full wave positive rectifier to produce -90V. The voltage is filtered by L3, C10 at J1-3. From TP7 to TP6 a 135V 209 kHz pulse is formed for output at J2-1, making use of the windings from TP7 to TP6 a third

time. The output form TP7 to TP13 is multipled by Voltage Multiplier and Rectifier CRT CR5, 6, 7, C6, 7 and 8, filtered by C11 and output at W+ 2 as the CRT cathode voltage -1.41KV. The 6.3 VAC CRT filament voltage is developed across the secondary of terminals 11 and 12, and sent to assembly output tiepoints 7 and 8.

51000 RF ATTENUATOR
(See Figure 6-59)

4.116 The RF Attenuator controls the input level of a selected RF input frequency at the CE-5110A antenna. The input goes to the RF IN on the attenuator assembly, and is either amplified or attenuated to produce an output to the 1st Converter (52000) Assembly. The RF Attenuator Assembly operation is controlled by the Front Panel SENSITIVITY (REF LEVEL dbm) control. In the MAX position the input RF is amplified +20dB. A +10V level is applied to test point 1, and goes through R12, turning on CR2. It also applies power to Q1, Q2, Q3 and Q4; and goes through R6 and R11 to turn on CR10. This gives the input RF at test point 6 a path through CR2 to Q2, through the +20dB amplifiers Q2 and Q4 (whose bias is controlled by Q1, Q3), to CR10, and output at test point 8. In the -40 position of the SENSITIVITY switch, the path goes through the assembly with no amplification or attenuation. The -40 position applies +10V to test point 2. This turns on diodes CR3 and CR4. The +10V also goes through CR11 to turn on CR6 and CR8 to give a straight-through path for the input RF from test point 6 to test point 8. When the SENSITIVITY switch is turned to -20, the RF Attenuator Assembly must attenuate the input RF by 20dB. To do this, the switch applies +10V to test points 3 and 5. The +10V at test point 3 goes through R24 to turn on diodes CR6 and CR8. At test point 5 the +10V turns on CR1 and CR5 to open a path from the test point 6 RF input, through CR1, to the 20dB attenuator pad R20, R21,and R22; and out to test point 8 through diodes CR5, CR6, and CR8. In the 0 position, the SENSITIVITY switch must turn on 40dB of attenuation in applying +10V to test point 4. This opens a current path for the input RF signal through both 20dB attenuator pads by forward biasing CR7 and CR9, and through CR12, CR1 and CR5. The input RF path then is through CR1, 20dB pad R20, R21, R22, CR5, CR7, 20dB pad R26, R27, R28, and CR9 to the output test point 8. From test point 8, the signal goes to the 1st Converter Assembly (52000).

52000 1ST CONVERTER
(See Figure 6-61)

4.117 In the 1st Converter, the input RF signal from 51000 Assembly is converted to the first IF for processing. The 100 kHz to 1 GHz input RF signal comes onto the assembly at Test Point 1 and goes through an etched PCB assembly microstrip lowpass filter to mixer CR1. The L.O. input to CR1 is from Test Point 3, and is a 2.08-3.07 GHz signal that is amplified through L.O. amplifier Q3 and Q1 (bias controlled by Q4, Q2) and applied to the mixer. The mixer output will be the difference frequency of 2080 MHz to 2070 kHz (3.07 minus 1 GHz). This 2080-2070 MHz IF is amplified by Q5 and Q6 and output at Test Point 4 through a banpass filter to the 2nd Converter.

53000 2ND CONVERTER
(See Figure 6-63)

4.118 The first IF input signal is converted to the second IF 210.7 MHz and then the third IF 10.7 MHz, which is output from the assembly. The output of the First Converter comes into the Second Converter Assembly at Test Point 6. It goes to diode mixer CR1 and CR2, where it is mixed with the Test point 5 input from the 1865 MHz Filter and Amplifier Assembly (66000). The mixer output is the 210.7 kHz difference frequency that is amplified by Q2 (Q3 is bias control) and applied through a tuneable bandpass filter to amplifier Q6. The amplified 210.7 MHz signal is taken from the collector of Q6 and applied to mixer Z1 with a 200 MHz input at +P-8. The 10.7 MHz difference frequency is amplified through Q4 and passed through a 10.7 MHz bandpass filter to remove unwanted mixing harmonics. The output is then buffered through Q1 for output at Test Point 7.

61000 159.3-169.3 MHz IF
(See Figure 6-66)

4.119 The 200 MHz input via Cable S from the 37000 Assembly is coupled to a 3dB impedance matching pad R7, R8, and R9. The signal is split. One output is coupled through C13 to the 200 MHz output (-4dBm), going on to the 210.7 MHz IF Assembly (62000). The other power splitter output is coupled through CR and passed through C5 and L2 lowpass to the base of Q1, a 200 MHz amplifier. The collector output of Q1 is filtered through inductor L10 and coupled through C11 to the L.O. input of mixer Z1 at approximately +6dBm. The RF input to

Z1 is the 30.7-40.7 MHz output of the Loops A and B VCO/Phase Detector Assembly (29000). It is coupled through C1 to the 50 MHz lowpass filter C2,L1,and C3. The filter output is then passed through the 5dB impedance matching pad composed of R1, R2,and R3 to the Z1 mixer RF input. The Mixer output is applied to lowpass filter C16, L5, and C17 which selects the difference frequency component in the composite mixer output, 159,3- 169,3 MHz. The duplexer circuit C14, C15, R14, and L6 at the Z1 mixer output is used for impedance matching. It holds the IF mixer port at 50 ohms impedance for products above the 149.3-169.3 MHz frequency of the lowpass filter to prevent reflected products causing spurious outputs. The 149.3- 169.3 MHz output is sent to the VCO and 1865 MHz Up Converter Assembly (63000).

62000 210.7 MHz IF
(See Figure 6-68)

4.120 The 10.7 MHz output of the 36000 Assembly is coupled onto this assembly through C1 and passed through lowpass filter C2, C3, L1 and 6 dB pad R1, R2, and R3; to the double-balanced mixer BM1. In the mixer it is added to a 200 MHz reference input from the 159.3-169.3 MHz IF power splitter circuits. The 200 MHz is coupled through C4 and filtered through C5, and L2. It is amplified through Q1 and input to mixer BM1. The 210.7 MHz output of the mixer, the sum of the input frequencies, is filtered by C10 and L5 before being amplified through Q2. The output of amplifier Q2 goes through lowpass C15 and L6 to pin attenuator CR2 and CR1. The attenuation presented by the diodes to the signal is controlled by the automatic leveling control (ALC) circuit of the 21000. This gives the SIG GEN circuits a controlled output level. The signal is amplified again in Q3 and output to the 64000 Assembly.

63000 VCO AND 1865 kHz UP CONVERTER
(See Figure 6-70)

4.121 The SINAD circuits input signal comes in at P1-3, C from the Front Panel SINAD IN jack. The input consists of the required 1 kHz tone output of the receiver being tested, plus all additional frequencies of noise harmonics, and other distorting signals generated in the receiver. This composite signal of 1 kHz tone, noise and distortion goes to pin 3 of dual operational amplifier U10. The two U10 amplifiers are connected in cascade, so that the output of the first drives the second, and amplifies the input. The output signal is positive limited by CR1 and used to control the current through Q2. This causes Q2 to act like a variable resistance, controlling the gain through the cascade amplifier pair and keeping the output level constant regardless of input level changes from .03-3 volts RKS from the receiver under test. Another automatic gain control (AGC) circuit consisting of the four cascaded amplifiers contained in dual operational amplifiers U11 and U12, provides additional leveling of the SINAD input signal to assure there is no level change in the signal to give erroneous readings. The output of U12-7 is fed back through AGC control potentiometer R38 to the U11-5 second amplifier. It is also used to drive the Q3 gate, causing Q3 (like Q2) to operate as a variable resistor controlling the U11-1 output level.

4.122 The output of U11-1 is now a constant level composite signal of 1 kHz, with components of the receiver noise and distoriton. It is applied to the 1 kHz signal is removed, leaving only noise and distoriton in the signal. The noise and distortion components are then amplified and rectified in the U13 precision average value rectifier circuit, and the U13-7 output ot P1-5/E (Meter +) and P1-4/D (Meter -) used to drive the indicating meter.

4.123 This assembly contains the 1.7 GHz VCO circuit, a filter for the 159.3-169.3 MHz input signal, and a mixer circuit. The 1.7 GHz VCO is composed of Q1 and associated circuitry. The VCO tuning is controlled by the VCO Control Voltage input, from the 1.7 GHz PLL Assembly (71000), to varicap CR3. The VCO bias voltage is controlled by on-board regulator Q2 which prevents external line variations on the +10V input from being transferred to the VCO output frequency. Trimmer Capacitor C13 is used to adjust the final output frequency to keep CR3 operating at mid-range and maintain temperature stability. The 1.7 GHz VCO output goes to buffer amplifier Q3 for output through 3dB pad R10, R11, and R12 to the mixer circuit where it is mixed with the filtered 159.3-169.3 MHz IF input from the 61000 Assembly. Resistors R1-R3 and R17-R19 are 10dB pads used only for test purposes. The mixer output is the sum of 1.7 GHz VCO and 159.3-169.3 MHz frequencies of 1859.3 to 1869.3 MHz to the 1865 MHz Filter and Amplifier Assembly 66000.

64000 210.7 MHz BPF
(See Figure 6-71)

4.124 The purpose of this bandpass assembly is to remove unwanted mixing products and harmonics from the 210.7 MHz IF signal. The input signal from the 210.7 kHz IF Assembly is filtered through L1 L9, and C1-C7 and output to the 65000 Assembly. Inductors L6-L9 are to microstrip inductor. Capacitors C2-C6 are variable to allow adjustment of the filter bandpass and free rejection around the 210.7 MHz center frequency.

65000 2.075 GHz UP CONVERTER
(See Figure 6-72)

4.125 The filtered 210.7 MHz IF signal comes to this assembly from the 64000 Assembly. It is passed through impedance matching pad R8, R9, and R10 and coupled through C6 to lowpass C10, and L1 (microstrip inductor) and to mixer CR1, CR3, and T1. At the mixer the 210.67 MHz IF is mixed with the 1859.3- 1869.3 MHz input from the 66000 Assembly. The mixer summation frequency of 2.070-2.080 GHz is amplified through Q2, and Q1 and output to the 75000 Assembly through a 2075 $\pm$5 MHz coaxial bandpass filter.

66000 1865 MHz FILTER AND AMPLIFIER
(See Figure 6-73)

4.126 An 1865 MHz singal from the 63000 Assembly enters at Terminal 1 and goes to a 3-pole microstrip interdigital bandpass filter. This filter removes any mixing products that might remain in the Up Converter output. The filtered output goes through a microstrip impedance match section to base of amplifier Q1. Output from Q1 collector is coupled to another microstrip filter which can be tuned by C8 to center the 1865 MHz in the bandpass. This filter output is impedance matched to the base of Q2 and Q3, increasing the signal by a nominal 18 dB. The output at the collector of Q3 is coupled to the receiver for the Monitor mode. When the unit is in SIG GEN mode, +10V is applied to Terminal 5 turning on Q4. The output of Q3 is picked up by a directional coupler and applied to Q4. The 1859.3-1869.3 MHz output from Q4 is coupled to the 2075 MHz Up Converter (65000).

69000 YIG INTERCONNECT
(See Figure 6-74)

4.127 The 69000 YIG Interconnect carries the 2.1-3.1 YIG oscillator, the 1/4A FM Coil Driver fuse 3 +10V lines FM driver line and Main Coil Driver line, 5.91. The FM Coil Driver signal comes in P2-12 from the 27000 Asembly as +10V to C8-YIG Feed-Thru Capacitor and is returned through C7 Feed-Thru to TB1-5 through F1 to TB1-4 and back out through P2-1 to the 27000. The main driver signal comes in P2-6 from the 33000 Assembly as +10V to C9 Feed-Thru and out C10 and P2-7 to return to the 33000 Assembly. YIG Power and Heater lines are input to Feed-thru's C6 and C11 via P2-10 as a fused +10V.

71000 1.7 GHz PLL
(See Figure 6-76)

4.128 The 1.7 GHz PLL has two signal inputs and two outputs. The first input is 100 MHz from the 37000 circuit card. The signal is amplified by Q1, Q2 100 MHz amplifier, while U1 provides a negative feedback which maintains the map level constant. The output of the 100 MHz amplifier is taken from the collector of Q2 and applied to step recovery diode CR3 which acts as a 200 MHz harmonic comb generator. The second input to the 1.7 GHz PLL Assembly is the VCO Input from the 63000 Assembly. This 1.7 GHz signal is compared with the 17th harmonic of the 100 MHz combination generator in CR4 and CR5 phase detector circuit. If the signals are 90 degrees out of phase, there will be no input to U2-2, and the VCO control voltage output of U4 will be a steady-state voltage of +4.5V $\pm$.5. If the phase detector detects a frequency difference between the 100 MHz reference 17th harmonic and 1.7 GHz VCO Input, there will be signal at U2-6 whose frequency is detrermined by the amount of difference, and whose level will be greater than or less than +6V depending on whether the VCO is higher or lower than the reference frequency. The signal passes through Q3 FET, which is connected as a loop switch. to U4-2 loop filter and search amplifier from U2-6 OUT TP7 to the 1.7 GHz VCO tuning diode on the VCO and 1865 MHz Up Converter Assembly. The U4-6 output also goes to the "Out of Lock Indicator" drivers Q4, Q5 to drive the loop UNLOCK indicator.

4.129 The U2-6 output signal also goes to the loop lock-out circuit comprised of Q6, Q7, Q8, and U5. If the frequency at U2-6 is greater than approximately 80 kHz, the C38 coupling cap from Q6 emitter to the base of Q7 will pass the signal. It is detected and rectified by CR7 and CR8, and if the C42 averaging capacitor level causes U5-2 to exceed the pin 3 reference level, U5-6 will go low and switch off Q3. This opens the 1.7 GHz PLL and

causes the U4-6 control voltage to be driven through its search range (8VP-P). When the signal at U2-6 is less than approximately 80 kHz, or near lock, the Q6 emitter coupling cap C38 will not pass the signal. The U5-2 input will then be less than the pin 3 reference and U5-6 will go positive, turning on switch Q3 and closing the 1.7 GHz PLL to enable loop lock up.

4.130 A reference voltage of +6V ±% is generated by regulator U3 using the reference from the +10V MECCA supply.

72000 10 MHz SAMPLER
(See Figure 6-78)

4.131 When the front panel MHz (Frequency Select) switches are changed, the 10 MHz Sampler Assembly locks the YIG oscillator to the correct frequency. The oscillator is steered within range by the 208 MHz Sampler. A 10 kHz reference frequency comes into the 72000 from the TCXO. It goes through lowpass filter C1, L1, and C4; through amplifier Q1 and Q2; to a 3 pole lowpass filter L6, L7, L8, C8, C9, C13, and C15. The 10 MHz output of this filter is applied to a step recover diode, CR1. The resulting frequency combination is applied through T1 to the detector bridge CR2, CR3, CR4, and CR5. The 2.08-3.07 GHz input frequency from the 3dB Splitter and Buffer Assembly (74000) is applied to the detector bridge, buffered by Q3, and offset by a voltage set by potentiometer R2Q. This offset is to compensate for the detector bridge offset caused by unwanted harmonics. The detector bridge voltage output is taken at the junction of CR4, CR5, buffered by U1, and output to the YIG FM Coil Driver Assem bly (27000).

73000 208-307 MHz VCO/DIVIDE-BY-10 SAMPLER
(See Figure 6-80)

4.132 The 208-307 MHz VCO steering voltage from the YIG Main coil Driver (33000), is applied to CR1 and CR2 tuning diodes of the Q1 VCO. The 208-307 MHz VCO output is applied, through driver Q2, to the power splitter circuit T1. One T1 output goes through the centertap of T2, through buffer Q4 to U2, Divide-By-10. The U2 output, 20.8-30.7 MHz, is sent to U4, Divide-By-2 counter; where it is converted to 10.4 to 15.35 MHz and output at T7 to the 34000. The other output of the splitter goes through T2 to the power amplifier Q3, Q5, and Q7. The bias of Q7 is controlled by Q6. The amplifier output of Q7 is then applied to step recovery diode CR4, which generates harmonics of the 208-307 MHZ signal. The tenth harmonic, 2080-3070 MHz, is output to the CR7-CR10 sampler. In the sampler, the signal is compared with the 2080-3070 kHz YIG output from the 74000 Assembly, and the difference detected by the sampler buffer U3. Buffer U3 outputs the sampled difference to the YIG FM Coil Driver (27000).

74000 3dB POWER SPLITTER BUFFER AMPLIFIER
(See Figure 6-81).

4.133 The 3dB Splitter and buffer input is from the 76000 and goes to two places from the 3dB splitter L1 and R1. One output goes to the 72000 Assembly and the second is buffered by Q1 to go to the 73000 Assembly.

75000 FINAL MIXER AND 1.1 GHz LOWPASS FILTER
(See Figure 6-82)

4.134 The filtered 2.07-2.08 GHz input to the final mixer goes through impedance matching 3dB attenuation R1, R2, and R3; to highpass filter C1 with a microstrip inductor, to the CR1, CR2, T1 mixer circuit. The signal is mixed with 2.08-3.07 GHz YIG frequency from the Directional Coupler Assembly and the 0-1 GHz mixer difference frequency is extracted. It is filtered by an on assembly microstrip lowpass filter and sent to the Output Casting high level amplifier (82000).

76000 DIRECTIONAL COUPLER
(See Figure 6-84)

4.135 The Directional Coupler Assembly (76000) couples the YIG Oscillator 2.07-2.08 GHz output from Yig Interconnect Assembly (69000). The signal is directly coupled through a microstrip assembly to YIG OSC OUT of the Receiver Casting. It is Passed through a 10dB pad and a 12dB amplifier to the Final Mixer and 1.1 GHz Lowpass Filter Assembly (75000). The YIG OSC IN is sent through a 6dB pad and a 6dB amplifier to the 3dB Power Splitter Buffer Assembly (74000).

81000 OUTPUT PROTECTION/POWER DETECTOR
(See Figure 6-87)

4.136 The RF signal comes in at WT 8 from the Step Attenuator and is coupled through C7 to the CR4-CR7 limiter. This prevents any signal greater than ±1.0V from being accidentally coupled from the SIG GEN OUT/RF IN jack to the signal generator circuits, causing possible damage. If an RF signal is input to the SIG GEN OUT/RF IN connector, it

comes onto 81000 at WT 1 where it is detected. The detected level goes to the K1 relay on the Output Casting Assembly. It also goes through positive detector diode CR2 while negative limiter CR1 clips the signal negative position. Capacitor C3 averages the voltage variations to make a DC input signal at the U1-3 input. The level of the signal is determined by the input RF level, and if it exceeds the limit set by R1 at the U1-2 reference input, the U1-6 output will go HIGH, turning on Q1, Q2. When Q2 conducts it puts a ground on the Output Casting Assembly relay K1, causing it to actuate and switch the SIG GEN OUT/RF IN connector from the signal generation circuits to the 20dB RF Antenna Load on the Rear Panel. The output of the 20dB attenuator comes back to the 81000 Assembly at Wt 10. The signal is peak detected by CR8 and the detected level is output at WT9 to the 21000 Power Measurement Circuits.

82000 HIGH LEVEL AMPLIFIER
(See Figure 6-89)

4.137 This amplifier consists of a pair of wideband feedback amplifiers that amplify the 100 kHz-1 GHz input signal to the needed output level. An ALC detector circuit allows the Automatic Level Control on the 21000 to control the signal generator output level. The two feedback amplifiers Q1, Q2 and Q3, Q4 have their feedback controlled to maintain input and output impedances of each amplifier at 50 ohms and an overall amplifier gain of about 36dB. The output of the wideband amplifier is sampled at the collector output of Q4 and input to the U1 ALC detector. The signal is rectified by CR1 and the RF filtered by C19 and C20. Variations in CR1 as a result of differing temperatures are compensated by CR2. This maintains an input to ACL amplifier U1 that changes only with the output level of the wideband amplifier. The ALC detector output is sent to the 21000 Assembly. The RF output of the wideband amplifier goes to the 0-120dB Step Attenuator on the Front Panel to control the level to the 81000.

91000 AC/DC SWITCHING SUPPLY NO. 1
(See Figure 6-92)

4.138 This assembly contains the circuitry for converting the 115 VAC or 230 VAC to +12VDC. The converted +12V, or +12V is used on other assemblies all the voltages used in the CE-5110.

4.139 The AC comes onto the assembly at wire ties 1 and 2, P1-1 and 2, and is passed through line filter transformer T1. If the 115/230V slide switch or Rear Panel (S90001) is in the 115V position, CR1 is connected as a half wave rectifier, and C4, C5 are connected as a voltage doubler for the rectified output. The negative half wave of the 115V input is rectified through CR1 and charges C5 to its peak voltage (115 x 1.414, or approximately 163V) through thermistor R23. The positive half wave of the 115V input is rectified through CR1, and attempts to charge C4 (through R23) to its peak, but since the top of C5 is already at 163V, it has to charge to approximately 325V to achieve the 163V differential across C4, thus doubling the voltage. With S90001 in the 230V position, CR1 is connected as a full wave rectivier, and C4, C5 as a single output filter cap. Since the combination of C4, C5 tires to charge to the voltage peak, the rectified voltage at the top of C4 will still be approximately 325O as it was when S90001 was in the 115V position. Diode CR2 is a gass filled, two element device with a very fast response time used to suppress transient voltage excursions in the input.

4.140 The purpose of thermisters R1 and R23 is to reduce the initial turn-on surge current charging capacitors C4 and C5. Then as they warm up their resistance decreased to a low value for full curcuit efficiency. However, if the unit is turned off, and then turned back on while R1 and R3 are still warm and C4 and C5 are discharged, the surge to charge the capacitors won't be restrained by the resistance of the thermisters. The circuits of Q4, Q6 protect the AC/DC rectifiers from this. The input AC voltage, divided down by R11 and R12, turns Q4 off. Due to the long R16, C16 time constant, the cap cannot charge enough before Q4 discharges it to make the Q6 emitter more positive than its base, and Q6 will remain off. However, when power is turned off, Q4 cannot turn one, and C16 will charge sufficiently to turn on Q6. This applies a positive voltage to the U1 shutdown input, turning off the base drive circuit. this prevents the discharge of C4 and C5 and they will maintain a charge long enough for R1 and R3 to cool and again have enough resistance to protect against surge current.

4.141 To assure operation of the +12V converter circuits at unit turn-on, the assembly has a starting circuit consisting of a switch (Q3, controlled latching circuit (Q5, Q7), and a power rectifier feedback loop (C21, CR20, CR21, and T3 secondary coil). when initially turned on, there is rectified AC at the CR1 bridge rectifier output,

but no voltage to the transformer, T3. Therefore, the T3 secondary feeding CR20, CR21 will have no voltage impressed upon it, and Q3 will be turned off. With Q3 off, the rectified AC at the CR1 output will be felt across R17 at the emitter of Q5, and C15 will start to charge. As the charge on C15 reaches 30 volts, it will turn on CR18, which turns on the latch Q5, Q7. When Q5, Q7 are turned on, the 30 volt charge (which was formerly on C15) will be divided between C15 and C21. As C21 becomes charged, it supplies power for the U1, Q8-Q11 control circuits. This starts the T3 output transformer operation, and as the T3 feedback loop secondary begins supplying voltage to the rectifier circuit of CR20, CR21, and C21 it turns on Q3. When Q3 turns on, it turns off latch Q5, Q7, and the base drive control circuit power is sustained by the feedback loop of output transformer T3.

4.142 The control circuit output is determined by the operation of the regulating pulse width modulator U1, whose output pins 12, 13 control the push-pull drivers Q8, Q10, and Q9, Q11 to the primary of T2. The oscillator frequency of U1 is approximately 36 kHz, and is set by R29, C17. In push-pull operation the oscillator enables first one and then the other output, which divides the output frequency by half, to about 18 kHz. If the pin 12 output goes HIGH, pin 13 will be LOW. This turns on Q8, Q11, opening a current path through Q11 to T2 pin 1 (the dotted side of the T2 primary, then through the primary to the emitter of Q8 and through Q8 to ground. If pin 13 goes HIGH pin 12 will be LOW and Q9 Q10 will be turned on. This opens a current patch in the opposite direction through the T2 pin 2 primary from Q10 to ground at the collector of Q9. The amount of time the pin 12 or pin 13 outputs of U1 stay HIGH is determined by the mount of eror in the output +12V. This error is determined on the 92000 error amplifier circuit and returned to the 91000 at the wire-tie 6 Feed Back input. A positive error (>12V) will increase the current to U2 and cause its output at pin 4 to become more positive. This goes to U1-1 pulse width modulator and causes the output pulse width at pins 12, 13 to compensate for the higher level by decreasing the output signal positive pulse width. This reduces the base drive to the Rear Panel Q90005 transformer drivers, and reduces the rectified output +12 VDC at wire-tie 8 to 92000 error amplifier circuits.

4.143 The starting load circuit of Q90006 (on Rear Panel), CR25-CR29, and R40-R42 provides a dynamic load for the power supply when the Front Panel POWER (STD BY/ON/OFF) switch is in the OFF or STD BY position, and the POWER (AC/OFF/EXTERNAL DC) switch is in the AC position.

92000 AC/DC SWITCHING SUPPLY NO. 2
(See Figure 6-94)

4.144 This assembly contains three power supply circuits. The error amplifier circuit for the 91000 rectified +12V output. The -7 and +6V supplies.

4.145 The error amplifier's +12V input comes onto the assembly at J1-3, with a gray wire from there to Terminal 4 on the assembly, and its output level set by pot R6. the output +12V is filtered through L1, C2 and goes to wire-tie 2 to be sent to the Front Panel POWER switch S10006. Error detection is done in the Q2, Q3 differential amplifier Base-emitter bias for Q3 is set by CR1 and the voltage drop across R9, which also sets the Q2 emitter voltage. The base voltage for Q2 is set by the voltage drop across R1, R6, R7 and selected by the setting of R6. Any fluctuation in the +12V will cause an increase of decrease in the base voltage of Q2 and cause it to draw more or less currrent through R3. This caused the base voltage of Q1 to vary also, and the error is amplifier through Q1 and sent to wire-tie 3 and from there to 91000 as the error feedback signal.

4.146 The -7V and +6V supplies are both controlled by the U1 regulating circuits. When first turned on, Q4-Q7 are turned off, and +12V is applied to U1-12 input. this turns on the +6V U1-6 reference voltage circuit to the R18, R21, R22 divider. Since there is no +6V output yet, the U1-4 comparator inverting input will be LOW, while the noninverting input to U1-5 is some positive voltage. This enables the U1-11 output, turning on Q4, Q6 and enabling Q5, Q7. The output of Q7 goes through R14 to one secondary winding of T1. This voltage opposes the voltage induced in this secondary by the primary T1 winding fed by Q5, and prevents Q5 from saturating at turn-on. The primary also induces a voltage in the other secondary winding which is rectified by CR5 and filtered by C4, C6 before being sent to wiretie 7 as the -7V output. As the input +12V saturates the T1 primary, the U1-4 inverting input will start to exceed the reference level set by R21 at the U105 noninverting input. This disables the VC output and turns off Q4, Q5, Q6, Q7. The saturated field in T1 will start to collapse, now pulling current through CR4. As the field collapses, U1-4 will again be less

than the level at U1-5, enabling VC and Q4, Q5, Q6, and Q7. The U1-11 VC output will continue to oscillate like this as long as the POWER (STD BY/ON/OFF) switch is in the ON or STD BY position. The output +6V is filtered by L3, C10 to remove the regulator switching fluctuations, and sent to wire-tie 5 for output.

93000 SPEAKER DRIVE
(See Figure 6-96)

4.147 There are two circuits: One amplifies the audio signals to correct level for operating the internal speaker; the second determines if the optional OCXO heater circuit is operating. The demodulated audio comes from 24000 to J2-2 and is coupled to U1-2. The variable gain of U1 is controlled by the photoconductor U3 in parallel with feedback R4. As an example, assume input at U102 starts to increase. This produces increase at U1-6 constant, which goes out J1-10 to Front Panel VOLUME control. The volume level returns at J1-8 and is amplified by Q1, Q2, Q3, Q4 before going to push-pull Q5, Q6 and then to J1-1 to drive the speaker.

4.148 The comparator U2 will light up the Front Panel OVEN LED whenever an over controlled crystal oscillator (OCXO) is installed and the oven heater comes on. This is a warning that oven temperature is low. Heater operation requires considerable current so it is connected to the +12V supply through the Front Panel OFF/ON/STANDBY toggle switch. Heater power comes in at J2-5 and goes through R20. An increase in heater current causes larger voltage drop across R20 and across voltage divider R24, R23. This produces a voltage at U2-2, compared with constant reference at U2-3 from dividers R21, R22. The increased drop across R20 causes decrease at U2-2, and U2-6 output increases, turning on OVEN LED. When the voltage drop across R20 decreases, the level at U2-2 will increase and U2-6 output will drop, turning off LED.

95000 DIVIDE-BY-N/PHASE DETCTOR
(See Figure 6-100)

4.149 The DIVIDE-BY-N/PHASE DETECTOR ASSEMBLY incorporates 4 circuits: 1) the BCD Programmable Divider, 2) a 10 kHz to 5kHz and 1 kHz Reference Frequency Divider, 3) Frequency Divider circuit for the 10.7 MHz PLL VCO, and 4) VCO control circuit fo the 88-100 MHz PLL.

4.150 The BCD Programmable Divider's active components are CR1 and 2, Q1 and 12, U1,2,3,4,5, half of U6,7 and half of U8. 13 P1 inputs are used to preset U2 to U5 (P1-6-10-12, and F-P) via the four Offset Generator MHz Thumbwheel switches and the 45 MHz/Off/Variable (Offset Generator switch) U1 is a binary (2, 5) RF counter. In the viariable position of the Offset Generator switch, 88-100 MHz is input through P1-4 to U1-12, divided by 2, output as 44-55 MHz at U1-15 and split. Half of the U1-15 output is routed via P1-4 for use on the 96000. The other half is input to U1-7, divided by 5, output at U1-4, buffered (ECL/TTL) by Q1 and split to clock U2 and (by way of U8A) U7. U2 is docade counter, each time it reaches a count of 10 one pulse is output. The number dialed on the corresponding thumbwheel switch one the Front Panel applies a preset to the counter which is loaded every time a pulse is felt at pin 11. For example, with preset loaded at 8, it counts 9.10 and outputs a pulse, if every output pulse causes aload pulse the counter will output 10 pulses for every 20 input. However, if aload pulse is only generated every 10 output pulses, 92 input pulses will be required for 10 out. U3, U4, and U5 function in the same manner with the exception that U5 is wired with only 2 states available; preset Ø (Ø on the 10 kHz Thumbwheel switch or Offset Generator switch to variable) and 1 (one on the 10 kHz Thumbwheel) switch or Offset Generator switch to 45 MHz). In this circuit the load pulse is only generated with an output from U5. The U5 output is applied to U6-12,U2,U3 and U4 are required to output at the same time. To trip and gate U6B, the pulse is buffered by U8B and input to JF FLIP-FLOP 07, if the pulse is present at the negative edge of a clock pulse from UBA the JK will switch states (having checked five separate parameters to assure signal validity greatly increases final output accuracy) supplying both a load pulse and a 1 kHz output to U9 (when PLL is locked) in the 88-100 MHz VCO control circuit.

4.151 The 10 kHz reference frequency divider is built by U11, half of U15 and the second half of UB for 5 kHz and 1 kHz reference frequencies U11 functions in the same basic manner as U1, the 10 kHz, P1-R input to U11-14 is output from U11-12 (2), split, buffered by U15B for output to the 96000 as a 5 kHz reference, the other half is input at U11-1, divided by 5, output at U11-11 buffered and shaped by U8C and U8D as a 1 kHz reference for the 88-100 VCD control circuit. The 10.7 MHz VCO (P1-13) input to U12-1 is divided by 5, output at U12-11, reinstated at U12-14, divided by 2 (10 total) and output to U13-14 from U12-12, U13 and U14 are 4 bit binary up/down counters (0-16 or

16-0) and function like U2-U5 except that they are wired to count down, U13 preset to 6 and U14 preset to 14, the load pulse is with every U14-13 output (buffered through U15A) so U14 requires 14 pulses from U13 for an output. Since U13 is preset 6, 214 pulses into U13 produces 1 U-14 output pulse (or 6+13x16) the final U14-13 output of 5 kHz (10.7 MHz 2140) is sent out P1-11 to the 10.7 MHz VCO Phase Detector on the 96000.

4.152 The final circuit on this assembly is made up of CR3, 03, 04 and 05. U6A, U9, and U10. U9 is duel negative edge triggered JK flip-flop which is used as a phase detector U9A is clocked by the U7-13 output of the programmable divider and cleared by the U11 reference and cleared by the same U7 output. If U9A and B are both clocked and cleared at the same. Neither flip-flop will change states, the potentials on the bases of Q3 and Q4 will be normal (about 3.6VDC) and the U10-6 output remains unchanged if the U7 output frequency increases from the normal 1 kHz, U9B will be cleared before it is clocked and it will change states, the base of Q4 will drop to about 1.7VDC, the voltage at U10-2 will increase causing a drop in the U10-6 output and corresponding drop in VCD frequency. If the U7 output goes below 1kHz the same procedure is activated in 09A, Q3 and U10-6 to increase and a corresponding VCD frequency increase. When either U9A or U9B changes state +5V is output from the Q pin for that section, it applied to U6A and to the J input of the other half of Q9, if the frequency has not corrected itself by the next clock pulse U6A will trigger, turning on Q5 and lighting PLL Unlock detector LED CR3.

4.153 The 94000 Offset Generator Interconnect PCB provides the means for transfer signals from the Offset Generator Front Panel to the 95000 Divide-By-N Phase Detector, the 96000 Down Converter, the 97000 Up Converter, and the 98000 88-100 MHz VCO. It is the Mother Board for the 95000 and 96000.

96000 DOWN CONVERTER
(See Figure 6-102)

4.154 The 96000 Down Converter PCB contains two circuits; A Down Converter and a 10.7 MHz Phase Lock Loop (LLP).

The Down Converter operates in two ranges, 44-50 MHz and .1-12 MHz. In the frist range; Q1, a 57 MHz Low Pass Filter, is turned off. The switch circuit at Q2 is also turned off at this time. The 15 MHz Low Pase Filter, Q5 and Q6, is turned on. The 44-50 MHz ECL Input from the 45000 DC/DC Converter is passed through the Filter and switch to RF AMP Q3 and Q4. The output is presented via the 84 cables to the 97000 Up Converter PCB. In the 0.1-12 MHz position Q1 and Q2 are turned on; Q5 and Q6 are turned off. Turning Q5 and Q6 off allows +10V to be felt at Q7 for Buffer Amplifier Q8 and Q9. This results in 100 MHz being amplified, buffered and sent to Mixer BM1. Mixer BM1 mixes 100 MHz with the 88-99.9 MHz from the 98000 VCO. The 0.1-12 MHz difference frequency pases through the 15 MHz Low Pass Filter, amplified in the RF AMP, and output to the 97000 Up Converter PCB.

4.155 The 10.7 MHz PLL has four inputs; 10.7 MHz from the 36000 FM/AM Modulation, AUDIO IN from the 31000 Audio Control, and 5 kHz REF IN and VCO IN 5 kHz from the 95000 Divide-By-N/Phase Detector. The 10.7 MHz from the 36000 PCB is routed through switch U1 (45 MHz/OFF/VARIABLE) to the 62000 230.7 MHz IF when the switch is in the OFF position. In either of the other two positions, U1 writes the signal to ground. This allows the on-board 10.7 MHz VCO to be amplified by Q12 and output to the 62000 PCB. AUDIO IN from the 31000 Audio Control is routed through the DEVIATION ADJ potentiometer and used to modulate the 10.7 MHz VCO. The 5 kHz REF IN is input through Phase Detector U3 along with the VCO IN 5 kHz. Any difference in phase relationship is converted to a DC level and presented to LOOP AMP U2. The amplified signal is used to drive the 10.7 MHz VCO circuit of CR3, C40 through 44, and L7. Amplifiers Q10, Q11, and Q12 buffer and amplify the 10.7 MHz signal for presentation to output amplifier Q13. The gain amplifiers Q10, and Q11 are controlled by R62. This signal is presented to the 95000 PCB, divided, and returned as the VCO IN 5 kHz.

The SIG GEN switch, Q14 and Q15, is used in the Monitor mode to buffer and amplify the 10.7 MHz for the 95000 PCB.

97000 UP CONVERTER
(See Figure 6-104)

4.156 The 97000 Up Converter mixes either 45 MHz or -1 to 12 MHz, MOD IN , from the 96000 Down Converter with 2.075 IN from the 65000 2.075 GHz Up Converter. This produces the desired upper and lower offset frequencies for final mixing and filtering by the 75000 Final Mixer/1.1 GHz LPF. The mixer is composed of CR1, CR2, L1, C3, C5, R13, and two 70.7 ohm microstrip transmission lines. The

output is passed through C8, a 6dB pi pad, and R2 through R4 to reduce unwanted harmonics. This signal is filtered, amplified by Q1, filtered again, and then amplified by Q2 for output to the 75000 PCB.

98000 88-100 MHz VCO
(See Figure 6-106)

4.157 The 98000, 88-100 MHz VCO contains the Voltage Control Oscillator (VCO) portion of the 88-100 MHz Phase Lock Loop (PLL). The PLL is controlled from the MHz (Frequency Select) Thumbwheel switches on the Front Panel via the 95000 Divide-By-N/Phase Detector PCB. Divide-By-N, Phase Detector, Unlock Detector, and Loop Error Amplifier circuits for the PLL are on the 95000 PCB. VCO CONTROL enteres the circuit card through varicap diodes CR1 and CR2 that control the frequency of oscillator Q1.

4.158 The oscillator output frequency ranges is trimmed by C8 and the signal capacitively coupled to amplifier Q2. The amplified, buffered, and filtered output of Q2 is sent to the 96000 Down Converter for synthesizing the .1 to 12 MHz offset.

SECTION 5
MAINTENANCE

GENERAL

5.01 This section contains information necessary to check CE-5110 performance and make recommended field adjustments. A troublshooting procedure for locating system problems down to the PC board level is included.

5.02 Due to the complexity of some circuits, and the special procedures necessary for their adjustment it is recommended that the instrument be returned to the factory or authorized service center for recalibration or repair. Refer to Section 2 for procedure to be used in returning an instrument for recalibration or repair. Contact Cushman Electronics, Inc. Customer Service Department for further instructions before returning an instrument.

5.03 In the following discussions it is assumed that the technician is familiar with the operating procedures described in Section 3.

5.04 Prior to making any adjustments the instrument should be warmed up for two hours with all covers installed, unless otherwise indicated.

5.05 Printed circuit boards and assemblies can be reached by removing the two side covers. Each cover is held in place by eight screws, and to each other by two additional screws. To remove the covers, stand the instrument on its back.

5.06 Figure 5-1 shows the location and access for all circuit boards and assemblies. Table 5-1 is a list of those circuit boards and assemblies. The drawing also shows, by their position in relation to the main chassis, the direction in which the components must be moved for removal.

PERFORMANCE CHECKS

Test Equipment Required

5.07 The following test equipment is required to check the CE-5110 for correct performance within published specifications. Any equivalent instrument may be substituted. If the equipment is unavailable, return the unit to Cushman Customer Service Department for calibration.

Frequency Counter, EIP 351D
Power Meter, HP-436A
Spectrum Analyzer, HP-8555A
Modulation Analyzer, HP-8901A
Oscilloscope, HP-180C
Power Detector, HP-8484A
Audio Generator, HP-204C
Distortion Analyzer, HP-331A
20dB Calibrated Attenuator, HP-8491B
Cushman Low Level Test Set
Cushman High Power Test Set
Signal Generator, HP-8640B
Attenuator 1dB, Step
Cushman SINAD Test Set, 5611-0265

SIGNAL GENERATOR MODE

5.08 The following tests are to be done to check the operation of the CE-5110 Signal Generator circuits. The Signal Generator Tests consist of Time Base Calibrated, Phase Lock Loop (PLL) Response, Output Signal Spur Check, Output Level Check, AM Modulation Check, and FM Modulation Check. Allow the unit to cool for 2 hrs. Start tests from a 20 second warm-up.

Time Base Calibration

5.09 The following test equipment is used for this test: Frequency Counter, EIP S51D. Perform the Time Based Calibration as follows:

a) Set the CE-5110 Function switch to SIG GEN CW mode.

b) Set the Step Attenuator to 0dB.

c) Set the CE-5110 SIG GEN/TG FINE switch to 0dB.

d) Set the Thumbwheel switches to 955.5555 MHz.

e) Connect the Frequency Counter to SIG GEN OUT/RF IN jack and measure output frequency. The readings should be from 955.5549 to 955.5561.

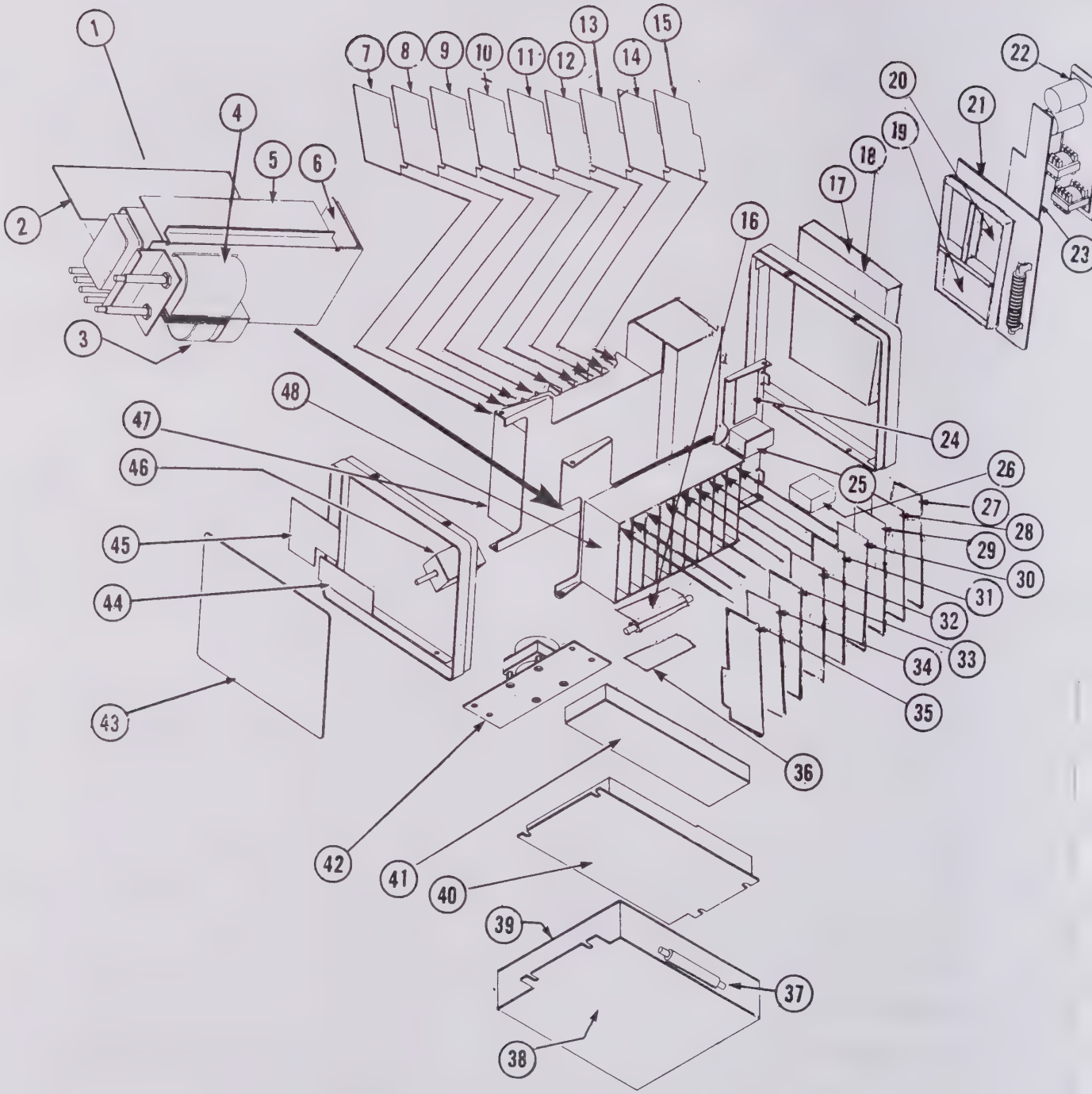


Figure 5-1. CE-5110 Circuit Location and Access.

Table 5-1. Assembly Location Table

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	40000 Oscilloscope Module	34	32000 FM/AM Detector No. 2
2	41000 Vertical Amplifier	35	31000 Audio Control
3	43000 Vert. Deflection Switch Mounting	36	30500 PCB Sweeper Relay
4	44000 Horiz Deflection Switch Mounting	37	2075 MHz Bandpass Filter
5	42000 Time Base and Horiz Amplifier	38	70000 Main Casting Assy (front) contains:
6	45000 DC/DC Converter		71000 1.7 GHz PLL
7	21000 ALC/Squelch/DC Control		72000 10 MHz Sampler
8	22000 Audio Synthesizer		73000 208-307 MHz VCO/.10/Sampler
9	23000 10.7 MHz IF		74000 3dB Pwr Splitter/Buff Amplifier
10	24000 FM/AM Detector No. 1		75000 Final Mixer/1.1 GHz LPF
11	25000 Bandpass Filter		76000 Directional Coupler
12	26000 Log Converter	39	60000 Main Casting Assy (rear) contains:
13	27000 YIG FM Coil Driver/Sweep Driver		61000 159.3-169.3 MHz IF
14	28000 Loops A and B Divide-By-N		62000 20.7 MHz IF
15	29000 Loops A and B VCO Phase Detector		63000 1.2 GHz VCO and 1865 MHZ Up Converter
17	95000 Divide-By-N/Phase Detector		64000 210.7 MHz BPF
18	96000 Down Converter		65000 2.075 GHz Up Converter
19	97000 Up Converter		66000 1865 MHz Filter and Amplifier
20	98000 88-100 MHz VCO	40	50000 Receiver Casting Assembly contains:
21	90000 Rear Panel Assembly		51000 RF Attenuator
22	91000 AC/DC Switching Supply No. 1		52000 1st Converter
23	92000 AC/DC Switching Supply No. 2		53000 2nd Converter
24	93000 Speaker Driver	41	80000 Output Casting Assembly contains:
25	94000 Time Base Octal Socket Assembly		81000 Output Protection/PWR Detector
26	Std. T.C.X.O.		82000 High Level Amplifier
-	OP-02 O.C.X.O.	42	69000 YIG Assembly
27	39000 10V/5V Regulators	43	10000 Front Panel Assembly
28	38000 SSB/Zero Beat Sweep Driver	44	11000 Frequency Select Switch Mounting
29	37000 Reference Frequency Generator	45	12000 Tone Generator Switch Mounting
30	36000 FM/AM Modulation	46	----- Attenuator
31	35000 Reference Frequency Divider/SINAD	47	20000 Left Card Cage
32	34000 Digit Decode/Divide-By-P	48	30000 Right Card Cage
33	33000 YIG Main Coil Driver		

Phase Lock Loop (PLL) Response

5.10 This test verifies that the Phase Lock Loop will hock-up properly. For proper operation the UNLOCK LED must illuminate and extinguish for each change of the Thumbwheel switches.

a) Set the 5110 FUNCTION switch to SIG GEN CW.

b) Switch the 1 MHz position Thumbwheel from 0 to 9 rapidly. Verify that the UNLOCK LED illuminates once or twice and them remains off.

c) Switch the 100 MHz position Thumbwheel switch from 1 to 9 and verify that the UNLOCK LED operates properly.

Output Signal Spur Check

5.11 This test verifies that the output signal is clean and free from excessive noise spikes. The following test equipment is used for this test: Spectrum Analyzer, HP-8555A; Attenuator 1dB, Step. Perform the test as follows:

a) Connect the Spectrum Analyzer to the CE-5110 SIG GEN OUT jack.

b) Set the FUNCTION switch to SIG GEN CW.

c) Set the RF Attenuator to -10dBm.

d) Adjust the FINE/OFF control to indicate 0dBm on the SIG GEN/TG Meter.

e) Set the Spectrum Analyzer at 100 MHz/DIV.

f) Step the CE-5110 in 100 MHz steps and observe the Spectrum Monitor display. Verify that any spurs are 35dB down, including harmonics.

g) Set the CE-5110 to 557 MHz and slowly narrow the dispersion down to 100 kHz/DIV. Observe the spurs on the Spectrum Monitor. Verify that any spurs are 35dB down, including harmonics.

h) Move the Frequency Entry switch through its range in 10 MHz steps and verify that any spurs are 35dB down, including harmonics.

Output Level Check

5.12 This test measures the output level accuracy ever 100 MHz, from 90 MHz to 990 MHz. Perform the test as follows:

a) Connect the CE-5110 to the HP-436A Power Meter.

b) Set the CE-5110 FUNCTION switch to the SIG GEN, CW mode.

c) Set the SIG GEN LEVEL switch to -10dBm.

d) Set the CE-5110 FINE switch to indicate 0dB on the SIG GEN/TG Meter.

e) Set the MHz (Frequency Entry) switches to 90 MHz. Increase the frequency in 1 MHz increments and observe the accuracy on the power meter. Verify that the level is -10 dBm $\pm$ 1.7dB, across the frequency range.

f) Set the MHz (Frequency Select) switches to 90 MHz and repeat step (e).

g) Set the CE-5110 FINE switch to indicate 10dB on the SIG GEN/TG meter.

h) Repeat step (e).

AM Modulation Check

5.13 This test checks for % of distortion for a given percent of Amplitude Modulation. Perform the test as follows:

a) Connect the HP-8901A, Modulation Analyzer to the CE-5110 SIG GEN OUT connector.

b) Connect the HP-331A Distortion Analyzer to the AF OUT connector of the Modulation Analyzer.

c) Set the CE-5110 FUNCTION switch to SIG GEN, AM mode, and verify that the CE-5110 FREQ ERROR Meter remains stable and reads center scale.

d) Set the CE-5110 SIG GEN LEVEL control to -10dBm.

e) Set the FINE control to indicate 0dB on the SIG GEN/TG Meter.

f) Set the Frequency Entry Thumbwheel switches to 450.000 MHz.

g) Set the Modulation Frequency to 1 kHz.

h) Set the METER FUNCTION switch to % AM.

i) Set the HORIZ switch to EXT.

j) Set the HP-180C Oscilloscope to 50%.

NOTE: If you shop does not have a Modulation Meter, one must be rented or the 5110 returned to Cushman for calibration.

k) Turn the CE-5110 MOD ADJ control until the HP-8901A Modulation Analyzer reads 30%.

l) Verify that the CE-5110 FUNCTION METER reads from 25% minimum to 35% maximum.

m) Verify that the INT SCOPE VERT SW reads from 25% minimum to 35% maximum.

n) Verify that the HP-331A Distortion Analyzer reads less than 4%.

o) Change the VERT SW to 150%/15K.

p) Turn the CE-5110 MOD ADJ control until the HP-8901A Modulation Analyzer reads 80%.

q) Verify that the CE-5110 FUNCTION METER reads from 73% minimum to 87% maximum.

r) Verify that the INT SCOPE VERT SW reads from 72% minimum to 88% maximum.

s) Set the INT SCOPE VERT SW switch to IF and the HORIZ switch to 1 ms.

t) Observe the displayed RF envelope for irregularities.

FM Modulation Check

5.14 This test checks for frequency modulation accuracy and demodulation irregularities.

a) Set the HP-8901 Modulation Analyzer controls as follows:

FUNCTION	kHz DEV
RANGE	10
PEAK	$\frac{P-P}{2}$
LOW PASS	15 kHz
HIGH PASS	30 Hz

b) Set the CE-5110 Communication Monitor controls as follows:

FUNCTION	SIG GEN/FM
SIG GEN LEVEL	-10dBm
MODULATION FREQUENCY (Hz)	1 kHz
MHz (Frequency Select)	152.15 MHz
METER FUNCTION	1.5 DEV kHz
VERT	1.5 kHz
HORIZ	1 ms

c) Connect the HP-8901A Modulation Analyzer to the CE-5110 SIG GEN OUT.

d) Adjust the MOD ADJ switch on the CE-5110 to produce 1.4 kHz deviation on the Modulation Analyzer.

e) Verify that the CE-5110 Oscilloscope and the HP-8901A, Modulation Analyzer agree within $\pm$ 60 Hz.

f) Adjust the MOD ADJ switch on the CE-5110 to produce 4.9 kHz deviation on the Modulation Analyzer.

g) Verify that the CE-5110 Oscilloscope and FUNCTION Meter agree within $\pm$ 200 Hz.

h) Adjust the MOD ADJ switch on the CE-5110 to produce 14.0 kHz deviation on the Modulation Analyzer.

i) Verify that the CE-5110 Oscilloscope and FUNCTION Meter agree within $\pm$ 600 Hz.

j) Adjust the FM CAL (Offset) switch for $\pm$ 15 kHz swing on the FREQ ERROR Meter without change in deviation or distortion. Zero the FREQ ERROR Meter and check for drift.

k) Set the OFFSET GENERATOR frequency to 15 kHz and repeat steps (k) and (l).

l) Verify that the CE-5110 Oscilloscope and FUNCTION Meter readings are unchanged.

MONITOR TESTS

5.15 The Monitor tests consist of Frequency Error Meter Calibration, SINAD Test, FM Sensitivity Check, AM Sensitivity Check, Residual FM Check, and AM Demodulation Check. The test equipment required for these tests is tested in paragraph 5.07. Return the unit to Cushman for Calibration if your shop does not have this equipment.

Frequency Error Meter Calibration

5.16 This test ensures that the CE-5110 FREQ ERROR Meter and Oscilloscope are calibrated to each other. Perform the test as follows:

a) Set the CE-5110 Controls as follows:

FUNCTION	MON/PFM
SENSITIVITY	MAX
SELECTIVITY	WIDE
METER FUNCTION	DEV 1.5 kHz
FREQ ERROR	RANGE 1.5 - ZERO Meter
HORIZ	1 ms
VERT	at 1.5 kHz zero line

b) Connect a coaxial cable from a calibrated 200 MHz source to the CE-5110 ANT IN connector (BNC).

c) Adjust the SQUELCH so that the SIGNAL LEVEL light illuminates.

d) Set the Oscilloscope VERT to 1.5 kHz and turn the VERT knob to center the trace.

e) Verify that the FREQ ERROR Meter and the Deviation Meter reads less than 100 Hz.

f) Set the FUNCTION switch to MON/AM.

g) Verify that the FREQ ERROR Meter does not vary more than $\pm$ 1 from 0 divisions.

h) Set the FUNCTION switch to MON/PFM.

i) Set the FREQ ERROR Meter to zero.

j) Set the MHz (Frequency Select) switch to 200.005 MHz and verify that the FREQ ERROR and Oscilloscope indicate + 1.5 kHz $\pm$100 Hz.

NOTE: Set the MHz (Frequency Select) switch to 200.0000 MHz and zero the scope and meter FREQ ERROR before each of the following steps.

k) Set the MHz (Frequency Select) switch to 200.0050 MHz and verify that the FREQ ERROR Meter and Oscilloscope read -5 kHz $\pm$100 Hz.

l) Set the MHz (Frequency Select) switch to 199.9985 MHz and verify that the FREQ ERROR Meter and Oscilloscope read +15 kHz $\pm$100 Hz.

m) Set the MHz (Frequency Select) switch to 200.0150 MHz and verify that the FREQ ERROR Meter and Oscilloscope read -15 kHz $\pm$600 Hz.

n) Set the MHz (Frequency Select) switch to 199.9850 MHz and verify that the FREQ ERROR Meter and Oscilloscope read +15 kHz $\pm$600 Hz.

SINAD Test

5.17 The SINAD test checks ability of the CE-5110 to measure the ratio of the signal plus noise plus distortion (SINAD) over noise plus distortion. This is always expressed in dB as shown in the following formula:

$$\frac{\text{SIG + NOISE + DIST}}{\text{NOISE + DIST}} \text{(in dB)}$$

This test is not meant to conform to EIA standards, but is used for checking meter function and SINAD circuits, a 1 kHz notch.

1) MOD OUT SINAD IN.
2) GENERATE +1 kHz.
3) MOD ADJ at zero.
4) FM/SIG GEN.
5) 1 kHz MOD ADJ for 15 kHz deviation on Meter Function.
6) GEN/OFF/GEN 1 kHz to GEN.
7) Set deviation to 12 kHz on Function Meter.
8) Meter Function switch to SINAD.
9) GEN/OFF/+ 1 kHz to GEN +1 kHz.
10) Enter MOD FREQ 2111 Hz.
11) Read 0dB on Function Meter.
12) Enter MOD FREQ.

Repeat steps 10 thru 12 for each frequency.

13) Enter 9450 Hz on MOD FREQ.
14) Set X1.0/X0.1/X.01/ to X0.1
15) Read -20dB.

a) Set the CE-5110 Controls as follows:

MODULATION	GEN + 1 kHz
1000 Hz	X1.0
MOD ADJ	Fully Counterclockwise
1 kHz MOD ADJ	Fully Counterclockwise
FUNCTION	SIG GEN/FM
METER FUNCTION	SINAD

b) Connect a coaxial cable from the CE-5110 MOD OUT connector to the 1 kHz INPUT of the SINAD Test Set (5611-0265).

c) Set the SINAD Test Set of 10 VRMS Tone.

d) Connect the Dana 4300 Digital Voltimeter (DVM) to the SINAD OUT of the SINAD Test Set.

e) Adjust 1 kHz MOD ADJ on the CE-5110 until the DVM reads 10.00 VRMS. Use the 1 kHz FIN ADJ on the SINAD Test Set to fine tune the output level.

f) Disconnect the SINAD OUT from the DVM and connect it to SINAD IN of the CE-5110.

g) Set the SINAD Test Set controls to 1 VRMS, TEST, and 10dB.

h) Verify that the FUNCTION Meter on the CE-5110 reads 10dB $\pm$ 1dB.

i) Set the SINAD Test Set to 20dB and verify that the FUNCTION Meter reads 20dB $\pm$1dB.

j) Set the SINAD Test Set to 12dB and verify that the FUNCTION Meter reads 12dB $\pm$1dB.

k) Set the SINAD Test Set to .3 VRMS, vary the output from 0.3V to 20V and verify that the FUNCTION Meter reads 12dB $\pm$ 1dB across the range.

FM Sensisitivy Test

5.18 This test measures the FM sensitivity of CE-5110 and its stability. Perform the test as follows:

a) Set the CE-5110 controls to the following positions:

FUNCTION	MON/PFM
SENSITIVITY	MAX
SELECTIVITY	NARROW
METER FUNCTION	SINAD

b) Set the HP-8640B Signal Generator to INT FM modulation, 1 kHz, 3.3 Hz DEVIATION, -60dBm output level, at 999.XXXX MHz.

c) Connect a coaxial cable from the DEMOD OUT jack on the CE-5110 to the SINAD IN jack.

d) Set the CE-5110 to the same frequency as the HP-8640B.

e) Verify that the SIGNAL LEVEL light illuminates and a sine wave is displayed on the oscilloscope.

f) Use the VERT and HORIZ controls to center the scope display.

g) Ensure that the FREQ ERROR Meter reads 0 Frequency Error.

h) Decrease the HP-8640B output level until the FUNCTION Meter reads 10dB SINAD.

j) Veriy that the HP-8640B output level is less than -101dBm.

k) Place the CE-5110 Power switch in the OFF position and re-apply power a minimum of ten times. Ensure that the sensitivity remains unchanged.

l) Set the HP-8640B and the CE-5110 to 124.XXXX MHz and repeat steps (e) through (l).

m) Set the SENSITIVITY switch to -40dB, -20dB, and 0dB respectively. Ensure that the output level of the HP-8640B remains at -81dB, -61dB, and -41dB respectively $\pm$2dB.

n) Set the HP-8640B and the CE-5110 to 10.2XXX MHz and repeat steps (e) through (k).

AM Sensitivity Test

5.19 This test measures the AM sensitivity of the CE-5110 and its stability. Perform the test as follows:

a) Set the CE-5110 controls to the following positions:

FUNCTION	MON/AM
SENSITIVITY	MAX
SELECTIVITY	NARROW
METER FUNCTION	SINAD

b) Set the HP-8640B Signal Generator to INT AM modulation, 1 kHz rate and 50% modulation.

c) Perform steps (c) through (n) of paragraph 5.18.

Residual FM Check

5.20 This test measures the level and stability for residual FM. Perform the test as follows:

a) Set the CE-5110 controls to the following positions:

FUNCTION	MON/FM
SENSITIVITY	MAX
SELECTIVITY	NARROW
METER FUNCTION	1.5 DEV kHz

b) Set the HP-8640B Signal Generator to CW at 20 microvolts output level.

c) Set the CE-5110 and the HP-8640B frequency to 999.XXX MHz and observe the residual FM levels on the HP-8640B Modulation Meter for <100 Hz residual FM.

d) Set the CE-5110 and HP-8640B frequency to 124.XXX MHz and observe the HP-8640B Modulation Meter for <100 Hz residual FM.

e) Set the CE-5110 and the HP-8640B frequency to 10.2XXX MHz and observe the HP-8640B Modulation Meter for <100 Hz residual FM.

f) Place the CE-5110 Power switch in the OFF position and re-apply power a minimum of ten times. Verify that the residual FM reading is unchanged.

g) Turn the FUNCTON switch to SIG GEN/FM and back to MON/FM a minimum of five times. Verify that the residual FM reading is unchanged.

h) Lift a corner of the unit 3 inches and drop it a minimum of five times. Verify that the residual FM reading is unchanged.

i) Open the SQUELCH control.

j) Set the MHz (Frequency Select) switches to 200.XXXX MHz.

k) Connect the HP-8640B Signal Generator to the ANT IN connector.

l) Set the HP-8640B to 200 MHz.

m) Turn the CE-5110 VOLUME knob full clockwise (cw) and observe that no feedback or hum is audible.

n) Set the SELECTIVITY switch to WIDE.

o) Perform steps (i) through (m).

NOTE: Three scope displays are available. Trapezoid and Modulation Envelope may also be selected.

AM DEMODULATION TEST

5.21 Perform the AM Demodulation Test as follows:

a) Set the CE-5110 Controls in the following positions:

MHz (Frequency Entry)	152.1500 MHz
FUNCTION	MON/FM
SELECTIVITY	WIDE
METER FUNCTION	%AM
HORIZ (PER/DIV)	EXT (SSB/BFO)
VERT (PER/DIV)	5 kHz x 10%AM

b) Connect a HP-331A Distortion Analyzer to the CE-5110 DEMOD OUT jack.

c) Connect a HP-8640 Signal Generator to the CE-5110 ANT IN jack.

d) Using a Bata MOD Meter verify 30% MOD.

e) Verify that the CE-5110 FUNCTION Meter and Oscilloscope measure between 25% and 35% Modulation with $\leq$4% distortion.

f) Set the HP-8640B for 80% Modulation.

g) Verify that the CE-5110 FUNCTION Meter and Oscilloscope measures between 75% and 85% modulation with $\leq$8% distortion.

INTERNAL OSCILLOSCOPE TEST

5.22 The Internal Oscilloscope tests consists of the CRT and LED Functional Test, DC Balance Test, EXT VERT Gain Check, Trigger Level Check, and the FM DEMOD Balance Check.

CRT and LED Functional Test

5.23 The CRT Function Test consists of checking the following controls for function:

SCOPE ON/INTENSITY
FOCUS
HORIZ (Adjust)
VERT (Adjust)

DC Balance Test

5.24 Perform the DC Balance Test as follows:

a) Set the VERT switch to 5V EXT (PER/DIV).

b) Turn VERT CAL-UnCAL full range and verify that the shift is less than 1.5 divisions.

HORIZ EXT Test

5.25 Perform the HORIZ EXT Test as follows:

a) Connect MOD OUT to the EXT SCOPE IN/HORIZ.

b) Set the HORIZ/DIV to EXT.

c) Set GEN/OFF/GEN +1 kHz to GEN.

d) Adjust 1 kHz MOD ADJ for 1V p-p.

e) Record the CRT reading.

f) Move the MOD OUT to HP-180C and verify that the reading is the same.

EXT Gain Test

5.26 Perform the EXT VERT Gain Test as follows:

a) Set the VERT switch to 50 millivolt EXT (PER/DIV).

b) Set the HORIZ (PER/DIV) switch to /ms/EXT(SSB/BFO).

d) Set the CRT trace to the -9 kHz line using HORIZ adjust.

e) Apply a 1V p-p 1 kHz signal from the EXT SCOPE IN.

f) Verify that the CRT displays a 1V p-p signal from the reference.

Trigger Level Check

5.27 Perform the Trigger Level Check as follows:

a) Connect MOD OUT to EXT SCOPE IN/VERT.

b) Set HORIZ/DIV to 1 ms.

c) VERT to EXT (PER?DIV) 0.5V.

d) Set the Function switch to SIG GEN/AM.

e) Set MOD ADJ switch to full CCW.

f) Set the GEN/OFF/GEN +1 kHz to GEN +1 kHz.

FM Modulation Balance Check

5.28 Perform the FM Demodulation Balance Check as follows:

a) Set the CE-5110 FUNCTION switch to SIG GEN/FM. Set the MODULATION GEN/OFF/GEN +1 kHz switch to the OFF position.

b) Center the FREQ ERROR Meter on the 1.5 kHz scale.

c) Set the VERT switch to the 1.5 kHz position and center the CRT trace.

d) Center scope trace with HORIZ ADJ.
e) Move the VERT switch to the 5 kHz position and then the 15 kHz position. Verify that the CRT trace remains constant within ± 2 divisions.

f) Vary FREQ ERROR +/-15 kHz and verify scope trace tracks accordingly.

POWER METER CHECK

5.29 The Power Meter Check consists of Meter Calibration, Power Detector Sensitivity (High), Power Detector Sensitivity (Low), and Power Detector Sensitivity (Internal).

Meter Calibration

5.30 Perform the Meter Calibration check as follows:

a) Set Meter Function to X10 PWR.

b) Set SIG GEN LEVEL to -50dBm.

c) Conncet a transmitter to a Bird Thruline Meter with 50 ohm load and measure power out.

d) Connect transmitter to SIG GEN OUT on RF IN on CE-5110.

e) Verify that the Function Meter is same as on Thruline Meter ± 5% of scale (FS).

Power Detector Sensitivity (Internal)

5.31 Perform the Internal Power Detector Sensitivity test as follows:

a) Set the CE-5110 FUNCTION switch to SIG GEN/CW.

b) Set the CE-5110 SIG GEN LEVEL switch to 0dBm.

c) Set the FINE control for maximum on the SIG GEN/TG Meter.

d) Step the MHz (Frequency Select) switch form 30 MHz to 60 MHz in 10 MHz increments.

e) Verify that the FUNCTION Meter does not energize.

OXCO OPERATION CHECK

5.33 Perform the OCXO Operation Check as follows:

a) Verify that power is applied to unit.

b) Set the CW GEN 0dBm out 990 MHz.

c) Connect an EIP 351D Frequency Counter to the CE-5110 SIG GEN OUT/RF IN connector.

d) Allow ten minutes warm-up for the CE-5110.

e) Verify that the frequency on the EIP 351D is the same as that of the CE-5110 within the range 990.000099 to 989.999901.

SSB/BFO CHECK

5.34 Perform the SSB/BFO Check as follows:

a) Set the CE-5110 FUNCTION switch to MON/FM.

b) Set the MHz (Frequency Entry) switches to 150.0000 MHz.

c) Set the SSB/BFO switch to the SSB/BFO position.

d) Set the HORIZ (PER/DIV) switch to the EXT position.

e) Connect the HP-8640B Signal Generator to the ANT IN connector.

f) Set the HP-8640B to 150 MHz and ensure an audible tone is heard as the control passes 150 MHz from above and below.

g) Set the VERT switch to IF.

h) Observe that a Lissajous pattern is displayed on the Oscilloscope at 150 MHz.

SPECTRUM MONITOR TESTS

HORIZ Scale Check

5.35 Perform the HORIZ Scale Check as follows:

a) Connect a coaxial cable from the HP-8640B signal generator to the ANT IN connector on the CE-5110.

b) Set the HP-8640B to 200 MHz.

c) Set the SIG GEN LEVEL switch to 0dB.

d) Set the HORIZ switch to 1 MHz/DIV and the FUNCTION switch to SPECTRUM MONITOR/TG.

e) The display should be within ± 0.5 divisions of center.

f) Set the HORIZ switch to 100 kHz/DIV and verify that the display remains within ± 0.5 divisions of center.

g) Set the HORIZ switch to 10 kHz/DIV and varify that the display remains within ± 0.5 divisions of center.

h) Set the MHz (Frequency Entry) switches to 200.0400 MHz. The display should be 4 ± 0.5 divisions to the left of center.

i) Set the MHz (Frequency Entry) switches to 199.9600 MHz. The display should be 4 ± 0.5 divisions to the right of center.

j) Set the HORIZ switch to 100 kHz/DIV.

k) Set the MHz (Frequency Select) switches to 200.4000 MHz. The display should be 4 ± 0.5 divisions.

l) Set the MHz (Frequency Select) to 199.6000 MHz. The display should be 4 ± 0.5 divisions.

m) Set the HORIZ switch to 1 MHz/DIV.

n) Set the MHz (Frequency Select) switches to 204.000 MHz. The display should be 4 ± 0.5 divisions.

o) Set MHz (Frequency Entry) switches to 196.0000 MHz. The display should be 4 ± 0.5 divisions.

p) Set the HORIZ switch to 100 MHz/DIV. The signal should appear 2 divisions from the left edge within ± 0.5 division.

q) Increase the frequency to 800 MHz and the signal should appear 2 divisions from the right edge within ± 0.5 divisions.

Log Scale Check

5.36 Perform the Log Scale Check as follows:

a) Set the FUNCTION switch to the SPECTRUM MONITOR/TG position and connect a coaxial cable from SIG GEN OUT to the ANT IN connector of the CE-5110.

b) Set the MHz SENSITIVITY switches to 150.0000 MHz.

c) Set the SIG GEN LEVEL switch to 0dBm.

d) Adjust the Signal Generator RF Level to the REF LEVEL dB 0 line on the scope. The HP-8640B should read 0dB ± 4.5dBm.

e) Set the SENSITIVITY switch to -20dB and reduce the Signal Generator's RF Level to the the top of the screen REF LEVEL dB 0 line. The HP-8640B should read -20dBm ± 4.5dB.

f) Set the SENSITIVITY switch to -40dB and reduce the Signal Generator's RF Level to produce REF LEVEL dB 0 line setting. The HP-8604B should read -40dBm ± 4.5dB.

g) Select MAX SENSITIVITY and reduce the Signal Generator output level to produce REF LEVEL dB 0 line setting. The HP-8640B should read -60dB ± 10dB.

h) Set the SENSITIVITY switch to 0dB and set the Signal Generator to 0dB REF LEVEL line. Step the signal generator step attenuator down in 10dB steps.

i) Set the MHz (Frequency Select) switches to 150 MHz.

j) Set the SENSITIVITY LEVEL to -20dBm.

CE-5110

k) Adjust the SIG IN to -20 or 0dB REF on Spectrum display at 150 MHz.

l) Set the HORIZ (PER/DIV) switch to 10 kHz/DIV.

m) Set the LOG DISPLAY switch to 1dB/DIV.

n) Adjust the OFFSET section of the LOG DISPLAY switch to set the CRT display at -3dB.

o) Set the HORIZ (PER/DIV) switch to 100 kHz/DIV and verify that the signal remains between -2.5 and -3.5dB.

p) Set the HORIZ (PER/DIV) switch to 1 MHz/DIV and verify that the signal remains between -2.5 and -3.5dB.

q) ADJ OFFSET to set CRT display at 0dB.

r) Reduce input signal 5dB, verify a 5 DIV change on CRT display to -5dB $\pm$ 0.5.

NOTE: At this point shut off the unit for a minimum of one hour. Then turn on, let warm-up for 5 minutes, and repeat the following tests as required by data sheet.

Output Level Check
AM Modulation Check
FM Modulation Check
FM Sensitivity Check
Meter Calibration
OCXO Operational Check
SSB/BFO Check

SPURIOUS RESPONSE CHECK (Spectrum Monitor Only)

5.37 Perform the Spurious Response Check as follows:

a) Connect an HP-8640B Signal Generator to the ANT IN connector on the CE-5110.

b) Set the MHz (Frequency Entry) switches to 155.0000 MHz.

c) Set the SIG GEN LEVEL switch to -40dBm.

d) Set the FINE control to OFF.

e) Set the LOG DISPLAY switch to 10dB/DIV.

f) Change the MHz (Frequency Entry) switches to 155.9000 MHz and observe the Oscilloscope for spurs.

g) All spurs must be less than 3dB above noise reference.

h) Set the Center Frequency to 159.9999 MHz and slowly vary the Signal Generator Frequency between 145 and 165 MHz. No spurs should be visible and the noise reference should be between the -70dB and -60dB lines.

i) Set SIG GEN LEVEL to -20dBm.

j) Set the CE-5110 HORIZ (PER/DIV) switch to 100 kHz/DIV.

k) Connect the HP-8640B to the ANT IN connector. Set the HP-8640B output level to -20dBm.

l) Vary the Center Frequency from 199.8 to 200.2 MHz and verify absence of base line shift. The signal should be within 2dB of the 0dB reference line.

m) Terminate the ANT IN connector with a 50 ohm load.

n) Set SIG GEN LEVEL to -40dBm.

o) Set CE-5110 HORIZ (PER/DIV) switch to 1 MHz/DIV.

p) Vary the Center Frequency in 10 MHz steps from 140 MHz to 160 MHz and 430 MHz to 460 MHz. Verify absence of spurs.

TRACK GENERATOR CHECK

5.38 Perform the Tracking Generator Check as follows:

a) Set the CE-5110 FUNCTION switch to the SPECTRUM MONITOR/TG position.

b) Adjust the CE-5110 FINE control for a -10dB position on meter.

c) Check for base line shift on CRT at these frequencies: 1 MHz, 10 MHz, 150 MHz, 450 MHz, 850 MHz. The base line shift should be below 57dB line on CRT.

5601-0082

d) Connect a cable from SIG GEN OUT connector on the CE-5110 to the ANT IN connector.

e) Set SENSITIVITY switch to -40dBm position.

f) Set the SIG GEN LEVEL to -60dB position.

g) Set the FINE Level to 0dB.

h) The trace on CRT should be on the 20dB line ± 4.5dB at these frequencies: 10 MHz, 450 MHz, 850 MHz.

i) Turn the FINE control to OFF position. The CRT display should revert back to Spectrum Analyzer mode.

j) Set the MHZ (Frequency Select) switches to 455 Hz. Set the HORIZ (PER/DIV) switch to 10 kHz/DIV.

l) Turn on the FINE control and adjust for maximum output.

m) Set the SIG GEN LEVEL to 0dBm.

n) Verify that the Signal Level on the oscilloscope is above -25dBm. Record this level for future reference.

o) Disconnect the cable from the ANT IN connector.

p) Switch SIG GEN LEVEL dBm to -40dBm. The noise on the oscilloscope should be below the line, listed in the table below, corresponding to the signal level observed in step (n).

Signal Level From Last Step	Noise Below This Line
0	-30
-10	-40
-20	-50
-25	-55

The noise level in this table conforms to a dynamic range of 70dBm.

Full and Variable Sweep Check

5.39 Perform the Full and Variable Sweep Check as follows:

a) Set the CE-5110 FUNCTION switch to the SPECTRUM MONITOR/TG position.

b) Set the CE-5110 HORIZ (PER/DIV) switch to the 100 MHz position.

c) Place the FINE switch in the OFF position.

d) Connect the HP-8640B Signal Generator output to the ANT IN connector of the CE-5110.

e) Turn the CE-5110 SWEEP control to the FULL position.

f) Tune the HP-8640B for 100.000 MHz at -20dBm.

g) Verify that the CE-5110 Oscilloscope displays a 100 MHz signal ± 50 MHz.

h) Set the HP-8640B frequency to 900.000 MHz.

i) Verify that a signal is present on the CE-5110 at 900.0000 MHz ± 50 MHz.

j) Turn the FINE switch ON.

k) Connect the CE-5110 SIG GEN OUT to the HP-855A Spectrum Analyzer input.

l) Set the HORIZ (PER/DIV) switch to 10 kHz.

m) Set the HP-855A to 2 MHz/DIV.

n) Verify that the sweep width is less than 10 MHz.

o) Set the CE-5110 SWEEP switch to VAR maximum.

p) Set the HP-855A to 50 MHz/DIV.

q) Verify that the sweep width is greater than 300 MHz.

r) Connect the CE-5110 SIG GEN OUT to the ANT IN connector.

s) Adjust the LOG DISPLAY/OFFSET switch from fully Clockwise (CW) to fully Counterclockwise (CCW). Ensure that no glitches or "zero crossings" are visible on the Oscilloscope.

t) Set the CE-5110 SENSITIVITY to 0dBm.

u) Set the SIG GEN LEVEL switch to -20dBm.

v) Set the LOG DISPLAY switch to 1dB/DIV, and adjust the OFFSET for the best display on the Oscilloscope and a frequency response of less than 5dB ripple.

w) Repeat steps (t) through (v) with the SWEEP control in the FULL position.

x) Verify that the frequency response shows less than 6dB ripple, peak-to-peak from 100 MHz to 1 GHz.

Offset Generator Check

5.40 Perform the Offset Generator Check as follows:

a) Set the CE-5110 FUNCTION switch to the SIG GEN/FM position.

b) Place the OFFSET GENERATOR 45 MHz/OFF/ VARIABLE switch in the OFF position.

c) Set the MODULATION FREQUENCY (Hz) switches to 400 Hz.

d) Set the HORIZ (PER/DIV) switch to 10 kHz.

e) Set the MHz (Frequency Select) Thumb-wheel switches to 150.0000 MHz.

f) Connect the HP-855A Spectrum Analyzer to the SIG GEN OUT connector on the CE-5110.

g) Observe the deviated signal on the HP-855A and mark the deviation limits.

h) Set the OFFSET GENERATOR 45 MHz/OFF/ VARIABLE switch to the VARIABLE position.

i) Set the OFFSET GENERATOR MHz Thumbwheel switches to 5.00 MHz.

j) Observe the upper and lower sidebands on the HP-855A

k) Adjust the deviation to 10 kHz and verify that the deviation limits marked in step (g) are unchanged.

l) Verify that the offset is exactly 5 MHz above and below the carrier and that the carrier suppresion is less than -20dBc.

m) Set the FUNCTION switch to SIG GEN/CW.

n) Set the HP-855A to 2 kHz/DIV.

o) Set the OFFSET GENERATOR 45 MHz/OFF/ VARIABLE switch to the OFF position.

p) Center the trace on the Oscilloscope.

q) Set the OFFSET GENERATOR 45 MHz/OFF/ VARIABLE switch to the VARIABLE position.

r) Set the FUNCTION switch to SIG GEN/FM and verify that there is no frequency shift in the suppressed carrier.

s) Verify that the LEVEL CAL lamp is extinquished.

t) Set the FUNCTION switch to the MON/FM position and observe that the upper and lower sidebands deviation is the same as in step (g).

u) Set the HP-8640B Signal Generator to 150.000 MHz and check the sensitivity for less than -20dBc.

v) Set the deviation of the HP-8640B to 5 kHz and verify that the deviation on the Oscilloscope and the FUNCTION Meter is unchanged.

w) Vary the OFFSET GENERATOR from 00.10 to 12.99 MHz, exercising all the digits, and verify that the shifts correspond to the selected frequency.

x) Check the carrier suppresion at 3, 5, and 45 MHz for a minimum of -20dBc.

5601-0082

Tracking Scope Check

5.41 Perform the Tracking Scope Check as follows:

a) Set the CE-5110 FUNCTION switch to the SPECTRUM MONITOR/TG position.

b) Turn the FINE control to the on position.

c) Set the NORM/EXT VERT switch to the EXT position.

d) Set the VERT switch to the 0.5V position.

e) Connect the HP-8640B Signal Generator to the EXT SCOPE IN connector of the CE-5110.

f) Set the HP-8640B to 1kHz.

g) Adjust the CE-5110 Oscilloscope for 1V p-p and verify that the deflection is 2 divisions.

External DC Check

5.42 Perform the External DC Check as follows:

a) Connect a 12 Volt supply to the Rear Panel EXT DC connector.

b) Adjust the supply output for +11V DC.

c) Verify that all major functions are operative and within specification.

ACCESS AND PARTS LOCATION

5.43 Printer circuit boards and assemblies can be reached in the CE-5110 by removing the two side covers. Each cover is held in place by eight screws, and to each other by two additional screws. To remove the covers, stand the instrument on its back to facilitate removal.

5.44 Figure 5-1 shows the location and access for all CE-5110 circuit boards and assemblies. The drawing also shows, by their position in relation to the main chasses, the direction in which the components must be moved for removal.

TROUBLESHOOTING

5.45 Troubleshooting procedures for the CE-5110 circuits are a series of flow diagrams. The diagrams illustrate a logical process of troubleshooting for problems encountered in normal operation. They do not show, and are not intended to show, all of the problems that might occur or all available solutions. They are presented as guides used to isolate problems to a printed circuit board. When the failed boards is located, it can be exchanged for a working board under Cushman Electronics' PC board exchange program. This will reduce instrument down-time due to failures to a minimum.

5.46 The test equipment required for troubleshooting is listed in paragraph 5.07.

5.47 The CE-5110 Functional Flow Diagram, Figure 5-2, an overall view of the operation and interconnection of circuits. The General Troubleshooting Diagram, Figure 5-3, is to be used to locate the functional section causing the problem, and for troubleshooting SINAD, power supply, and RF power measurement troubles. The Signal Generator Troubleshooting Diagram, Figure 5-4, is for troubleshooting problems traced to the signal generator function. The Monitor Function Troubleshooting Diagram is Figure 5-5, and is to be used to located problems in the Spectrum Analyzer, oscilliscope, Monitor, and modulation circuits. Figure 5-6 is the Phase Lock Loop Troubleshooting Diagram, and is for locating problems in the YIG and VCO loops.

5.48 If it becomes necessary to disconnect the cabling to the castings, the Main Casting Cable Interconnect (Figure 5-7), Output Casting Cable Interconnect (Figure 5-8), and Receiver Casting Cable Intercconect (Figure 5-9) drawings can be used as references for cable replacement.

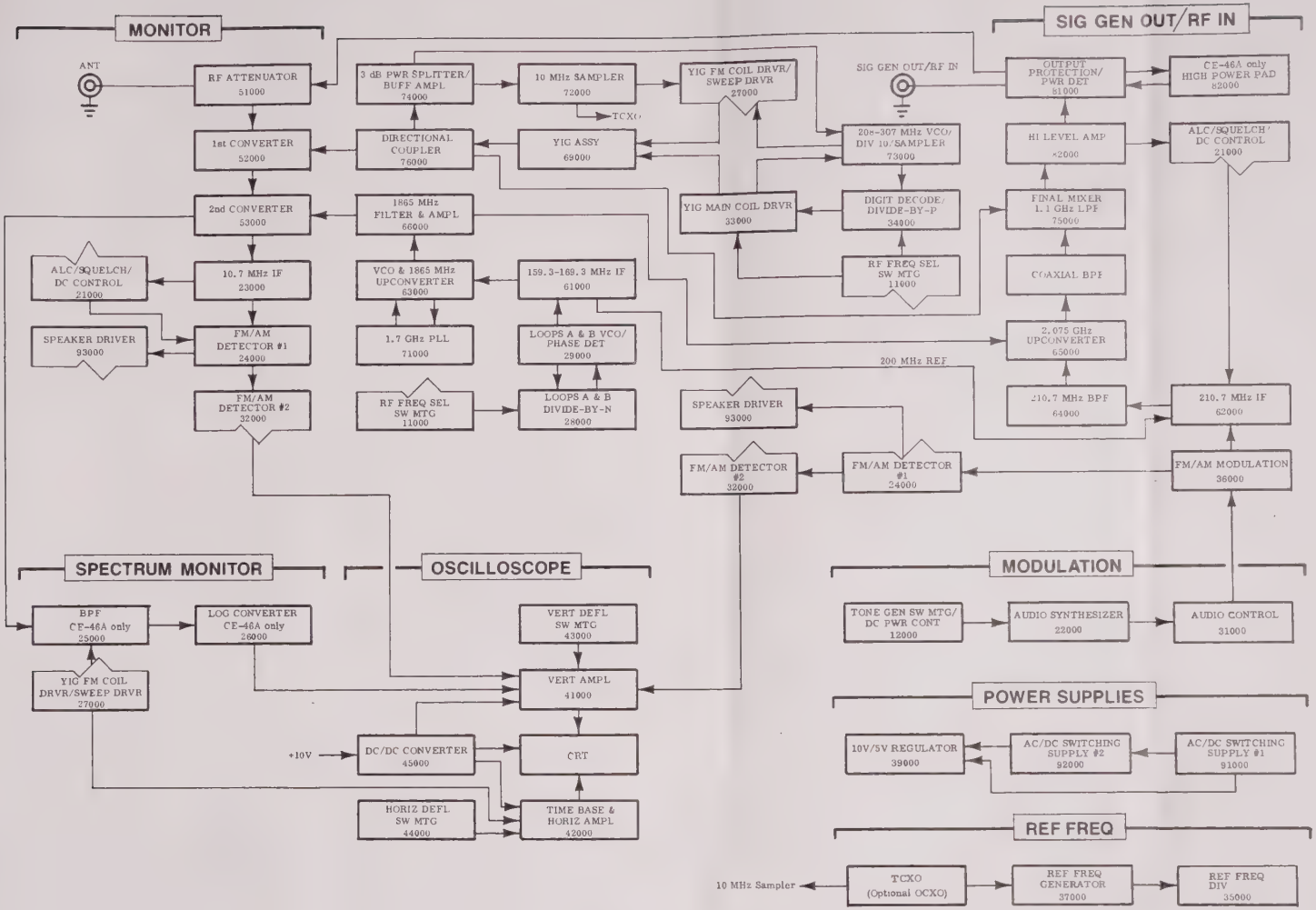


Figure 5-2. CE-5110 Functional Flow Diagram.

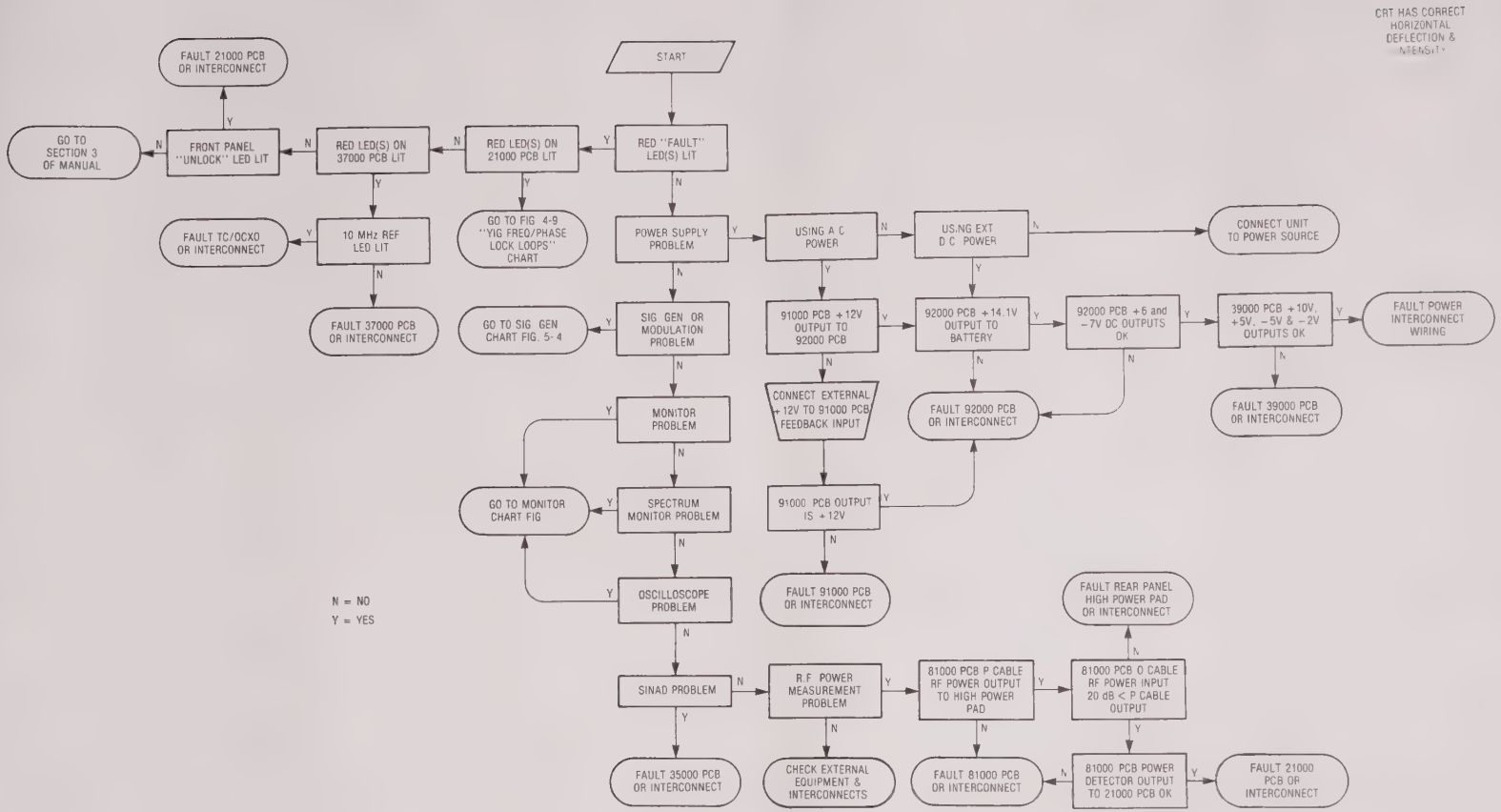


Figure 5-3. General Troubleshooting Diagram.

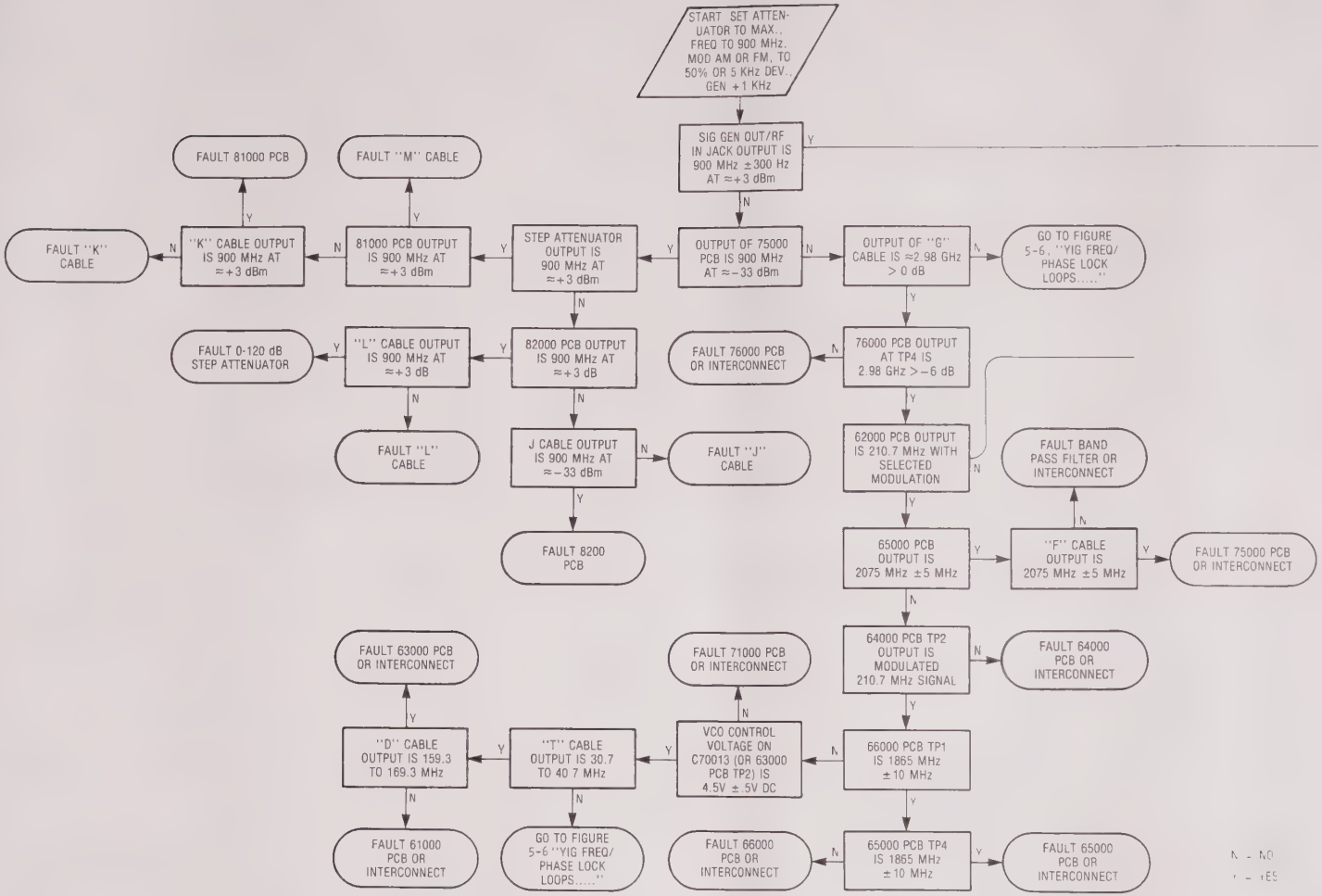


Figure 5-4. Signal Generator Troubleshooting Diagram.

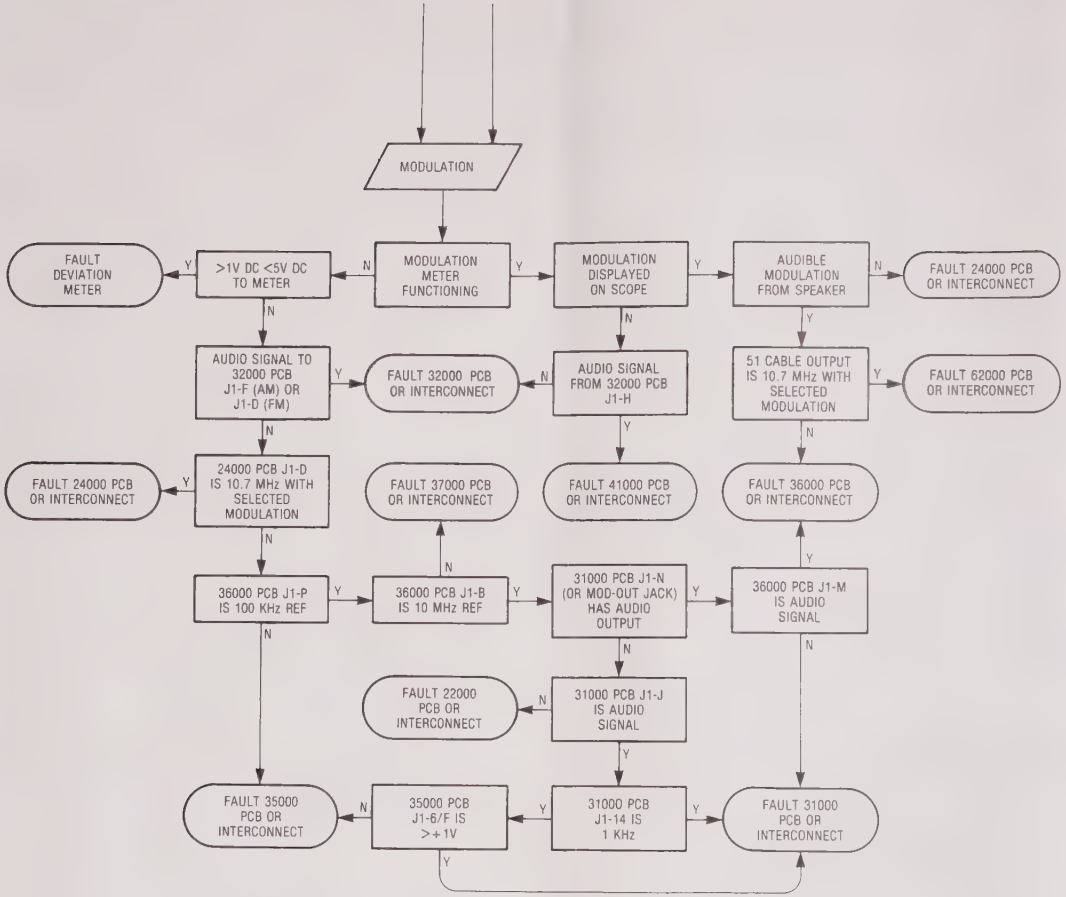


Figure 5-4. Signal Generator Troubleshooting Diagram. (Continued)

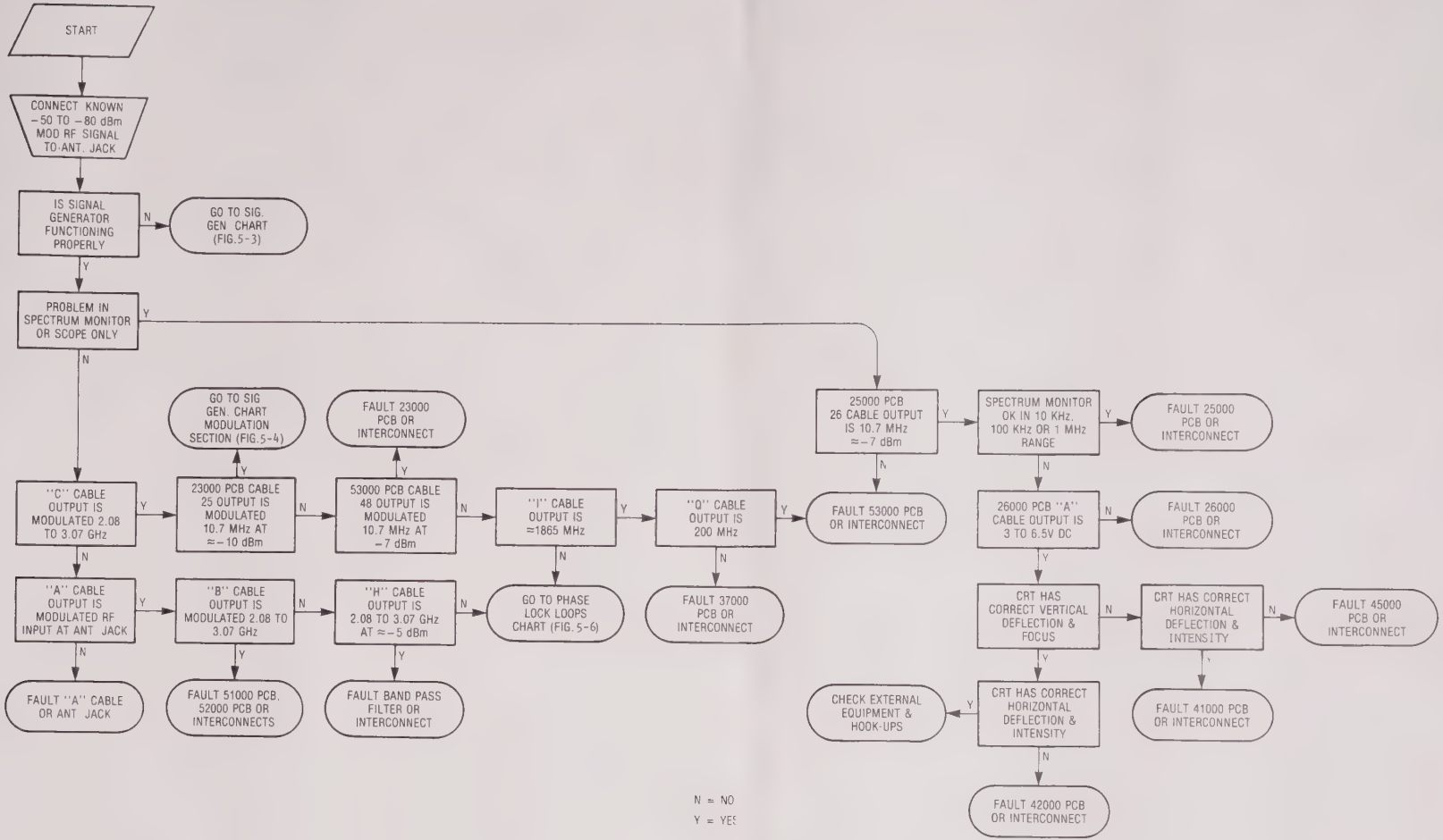


Figure 5-5. Monitor Funtion Troubleshooting Diagram.

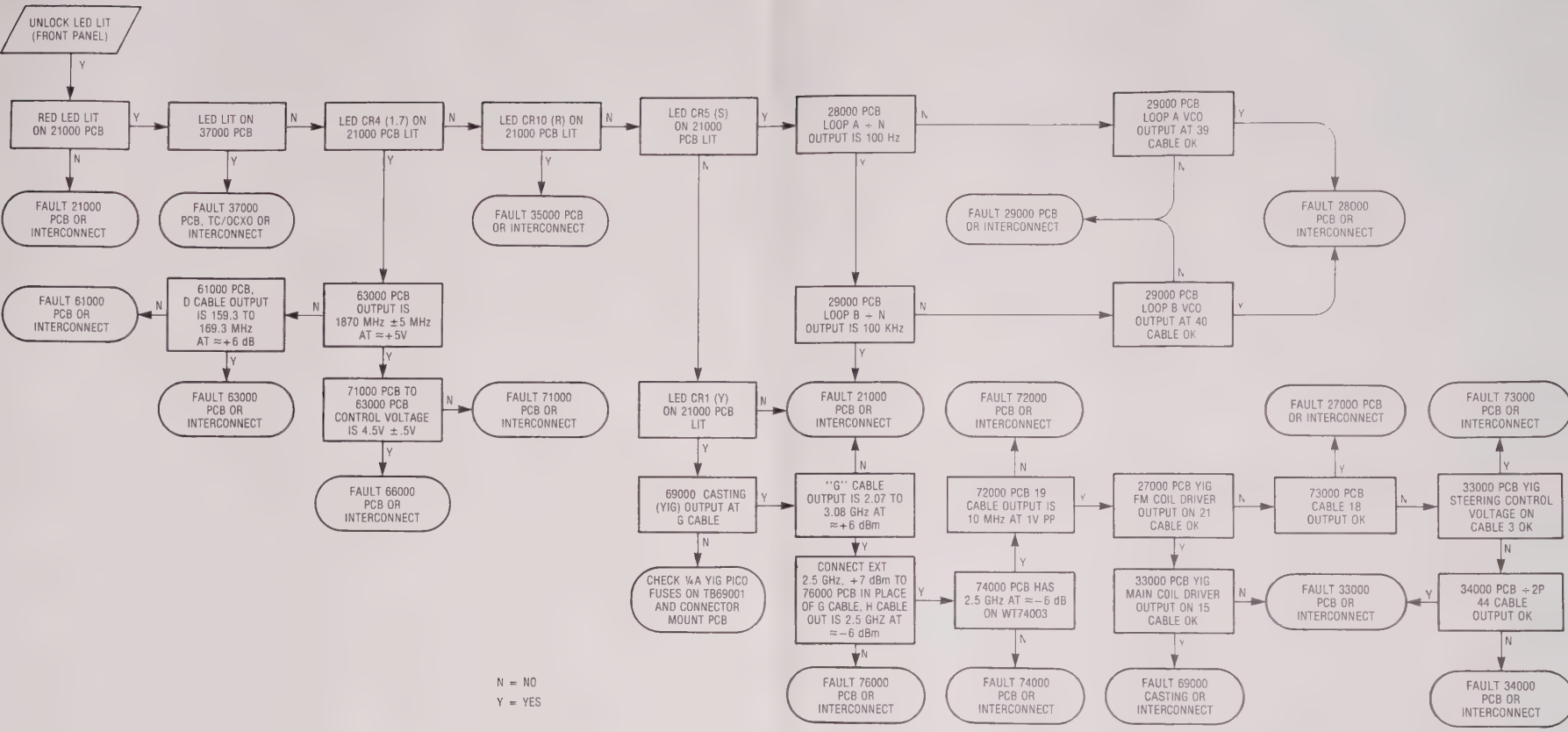


Figure 5-6. Phase Lock Loop Troubleshooting Diagram.

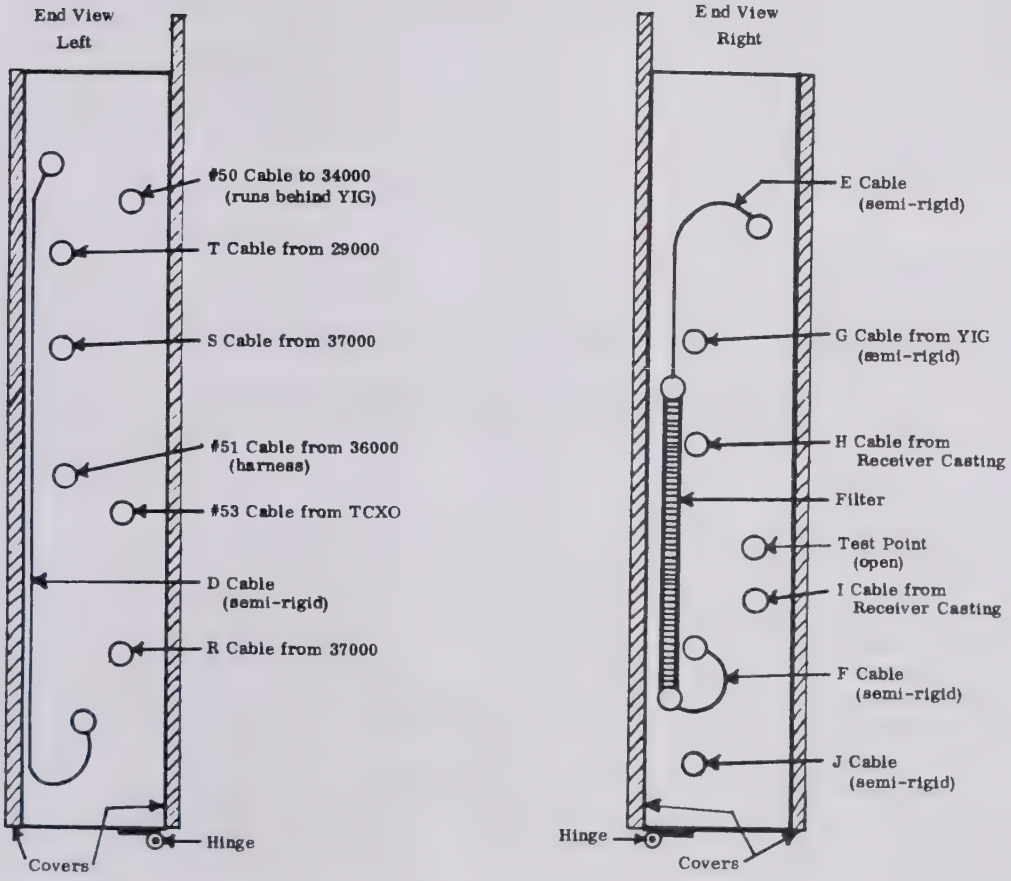


Figure 5-7. Main Casting Cable Interconnect

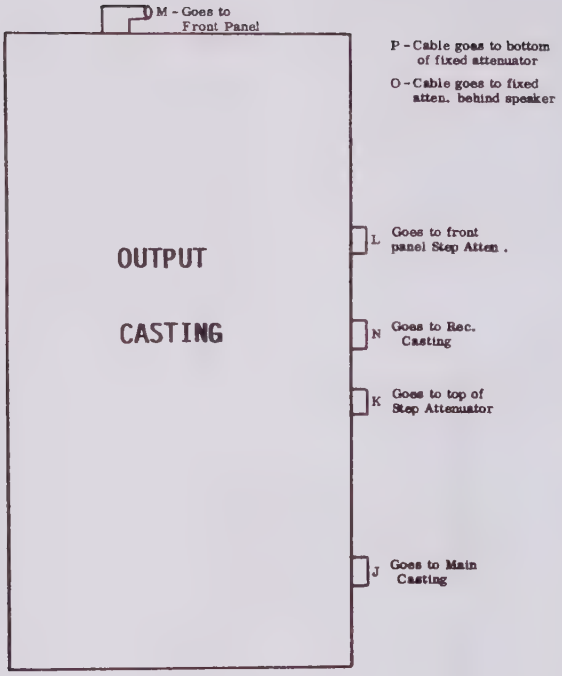


Figure 5-8. Output Casting Interconnect

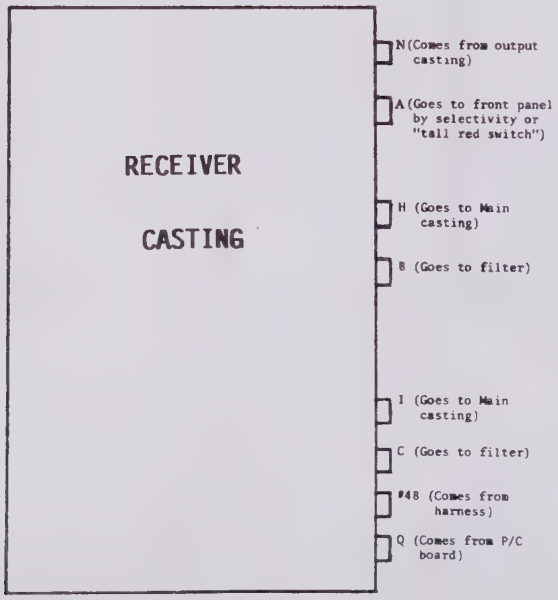


Figure 5-9. Receiver Casting Interconnect

SECTION 6
SCHEMATICS AND PARTS LISTS

6.01 This section contains the component location drawings, parts lists, and schematics for each circuit assembly. In addition the interconnect diagrams are included for major assemblies.

CIRCUIT REFERENCE SERIES

6.02 The Circuit Reference Series is a series of numbers assigned to the circuits of the instrument to make it possible to relate the actual circuit board or assembly to the schematic diagrams, the parts lists, and the text of the manual.

6.03 The series of numbers assigned to the CE-5110 are as follows:

10000 Front Panel
20000 Main Chassis, left side
30000 Main Chassis, right side
40000 Scope Module
50000 Receiver Casting
60000 Main Casting, top
70000 Main Casting, bottom
80000 RF Output Casting
90000 Rear Panel

Right and left sides refer to the instrument viewed from the front in an upright position. Board circuits of the 50000 through 80000 series are mounted in three microwave castings, although individual components associated with the castings can be located elsewhere on the instrument. Figure 5-1 shows the CE-5110 circuit board locations.

6.04 Under each main grouping the circuits are further divided into 10000 number groups (e.g., 41000, 42000, 43000), each of which represent circuit boards. On each circuit board the components are individually numbered in a series starting with 1, each type of component having a separate series as designated by a letter or letters. The complete reference to any component includes the circuit reference number, the individual component number and the letter type indicator. For example, the first resistor, R1, in the 21000 circuit will be R21001, the second transistor, Q2, will be Q21002, and so on. The printed circuit board plugs and connectors are similarly designated with pin numbers following the component reference as a dashed number. For example, the first plug for the 21000 circuit would be P21001, and pin 4 of that plug P21001-4.

6.05 When the individual circuits are described in the Circuit Description the component references will be abbreviated for convenience. Thus, R1 will refer to the first resistor on the board under consideration only. If reference is made to a component outside that board or when more than one circuit is being described, the full reference designation will be used.

6.04 In order to identify each board a cross reference table is given at the beginning of Section 6 listing the basic board numbers in sequence. These numbers are etched on each board. Also listed are the board title, assembly number, cricuit reference number and the figure and page number of the schematic diagram. The basic board number is the 1780-xxxx series. In cases where the board is too small for the complete number, only the last four digits are used. The basic number, along with the assembly number and the circuit reference number, also appears in the parts list for each board.

FIGURE NUMBER	TITLE	PAGE NUMBER
Figure 6-1.	10000 Front Panel Interconnect Diagram	6-7/6-8, 6-9/6-10
Figure 6-2.	11000 RF Select Switch, Component Location	6-11
Figure 6-3.	11000 RF Select Switch Mounting	6-15/6-16
Figure 6-4.	12000 Tone Generator Switch Mounting/DC Power, Component Location	6-17
Figure 6-5.	12000 Tone Generator Switch Mounting/DC Power	6-19/6-20
Figure 6-6.	21000 ALC/Squelch/DC Control, Component Location	6-21
Figure 6-7.	21000 ALC/Squelch/DC Control	6-27/6-28
Figure 6-8.	22000 Audio Synthesizer, Component Location	6-29
Figure 6-9.	22000 Audio Synthesizer	6-33/6-34
Figure 6-10.	23000 10.7 MHz IF, Component Location	6-35
Figure 6-11.	23000 10.7 MHz IF	6-43/6-44
Figure 6-12.	24000 FM/AM Detector No.1, Component Location	6-45
Figure 6-13.	24000 FM/AM Detector No.1	6-53/6-54
Figure 6-14.	25000 Bandpass Filter, Component Location	6-55
Figure 6-15.	25000 Bandpass Filter	6-59/6-60
Figure 6-16.	26000 Log Converter, Component Location	6-61
Figure 6-17.	26000 Log Converter	6-67/6-68
Figure 6-18.	27000 YIG FM Coil Driver/Sweep Driver, Component Location	6-69
Figure 6-19.	27000 YIG FM Coil Driver/Sweep Driver	6-73/6-74
Figure 6-20.	28000 Loops A and B Divide-By-N, Component Location	6-75
Figure 6-21.	28000 Loops A and B Divide-By-N	6-79/6-80
Figure 6-22.	29000 Loops A and B VCO Phase Detector, Component Location	6-81
Figure 6-23.	29000 Loops A and B VCO Phase Detector	6-87/6-88
Figure 6-24.	30500 PCB Sweeper Relay, Component Location	6-89
Figure 6-25.	30500 PCB Sweeper Relay	6-91/6-92
Figure 6-26.	31000 Audio Control, Component Location	6-93
Figure 6-27.	31000 Audio Control	6-97/6-98
Figure 6-28.	32000 FM/AM Detector No. 2, Component Location	6-99
Figure 6-29.	32000 FM/AM Detector No. 2	6-105/6-106
Figure 6-30.	32000 FM/AM Detector No. 2 (OP-04), Component Location	6-107
Figure 6-31.	32000 FM/AM Detector No. 2 (OP-04)	6-111/6-112
Figure 6-32.	33000 YIG Main Coil Driver, Component Location	6-113
Figure 6-33.	33000 YIG Main Coil Driver	6-117/6-118
Figure 6-34.	34000 Digital Decode/Divide-By-P, Component Location	6-119
Figure 6-35.	34000 Digital Decode/Divide-By-P	6-123/6-124

FIGURE NUMBER	TITLE	PAGE NUMBER
Figure 6-36.	35000 Reference Frequency Divider/SINAD, Component Location	6-125
Figure 6-37.	35000 Reference Frequency Divider/SINAD	6-129/6-130
Figure 6-38.	36000 FM/AM Modulation, Component Location	6-131
Figure 6-39.	36000 FM/AM Modulation	6-137/6-138
Figure 6-40.	37000 Reference Frequency Generator, Component Location	6-139
Figure 6-41.	37000 Reference Frequency Generator	6-145/6-146
Figure 6-42.	38000 SSB/Zero Beat/Sweep Driver, Component Location	6-147
Figure 6-43.	38000 SSB/Zero Beat/Sweep Driver	6-151/6-152
Figure 6-44	39000 10V/5V Regulators, Component Location	6-153
Figure 6-45.	39000 10V/5V Regulators	6-157/6-158
Figure 6-46.	40000 1 MHz Scope Module	6-159/6-160
Figure 6-47.	41000 Vertical Amplifier, Component Location	6-161
Figure 6-48.	41000 Vertical Amplifier	6-165/6-166
Figure 6-49.	42000 Time Base and Horizontal Amplifier, Component Location	6-167
Figure 6-50.	42000 Time Base and Horizontal Amplifier	6-173/6-174
Figure 6-51.	43000 Vertical Deflection Switch Mounting, Component Location	6-175
Figure 6-52.	43000 Vertical Deflection Switch Mounting	6-177/6-178
Figure 6-53.	44000 Horizontal Deflection Switch Mounting, Component Location	6-179
Figure 6-54.	44000 Horizontal Deflection Switch Mounting	6-181/6-182
Figure 6-55.	45000 DC/DC Converter, Component Location	6-183
Figure 6-56.	45000 DC/DC Converter	6-185/6-186
Figure 6-57.	50000 RF Receiver Casting	6-187/6-188
Figure 6-58.	51000 RF Attenuator, Component Location	6-189
Figure 6-59.	51000 RF Attenuator	6-193/6-194
Figure 6-60.	52000 1st Converter, Component Location	6-196
Figure 6-61.	52000 1st Converter	6-199/6-200
Figure 6-62.	53000 2nd Converter, Component Location	6-201
Figure 6-63.	53000 2nd Converter	6-205/6-206
Figure 6-64.	60000/70000 RF Main Casting	6-207/6-208
Figure 6-65.	61000 159.3-169.3 MHz IF, Component Location	6-209
Figure 6-66.	61000 159.3-169.3 MHz IF	6-213/6-214
Figure 6-67.	62000 210.7 MHz IF, Component Location	6-215
Figure 6-68.	62000 210.7 MHz IF	6-219/6-220
Figure 6-69.	63000 1.2 GHz VCO and 1865 MHz Up Converter, Component Location	6-221

FIGURE NUMBER	TITLE	PAGE NUMBER
Figure 6-70.	63000 1.2 GHz VCO and 1865 MHz Up Converter	6-225/6-226
Figure 6-71.	64000 210.7 MHz BPF	6-227
Figure 6-72.	65000 2.075 GHz Up Converter	6-229
Figure 6-73.	66000 1865 MHz Filter and Amplifier	6-231
Figure 6-74.	69000 YIG Interconnect	6-233
Figure 6-75.	71000 1.7 GHz PLL, Component Location	6-234
Figure 6-76.	71000 1.7 GHz PLL	6-239/6-240
Figure 6-77.	72000 10 Mhz Sampler, Component Location	6-241
Figure 6-78.	72000 10 MHz Sampler	6-245/6-246
Figure 6-79.	73000 208.307 MHz VCO/Divide-By-10 Sampler, Component Location	6-247
Figure 6-80.	73000 208.307 MHz VCO/Divide-By-10 Sampler	6-251/6-252
Figure 6-81.	74000 3dB Power Splitter Buffer Amplifier	6-253
Figure 6-82.	75000 Final Mixer and 1.1 GHz Low Pass Filter	6-255
Figure 6-83.	76000 Directional Coupler, Component Location	6-257
Figure 6-84.	76000 Directional Coupler	6-259/6-260
Figure 6-85.	80000 RF Output Casting	6-261/6-262
Figure 6-86.	81000 Output Protection/Power Detector, Component Location	6-263
Figure 6-87.	81000 Output Protection/Power Detector	6-265/6-266
Figure 8-88.	82000 High Level Amplifier, Component Location	6-267
Figure 6-89.	82000 High Level Amplifier	6-271/6-272
Figure 6-90.	90000 AC/DC Power Switching Interconnect Diagram	6-275/276
Figure 6-91.	91000 AC/DC Switching Supply #1, Component Location	6-277
Figure 6-92.	91000 AC/DC Switching Supply #1	6-281/6-282
Figure 6-93.	92000 AC/DC Switching Supply #2, Component Location	6-283
Figure 6-94.	92000 AC/DC Switching Supply #2.	6-287/6-288
Figure 6-95.	93000 Speaker Driver, Component Location	6-289
Figure 6-96.	93000 Speaker Driver	6-291/6-292
Figure 6-97.	94000 Offset Generator Interconnect, Component Location	6-293
Figure 6-98.	94000 Offset Generator Interconnect	6-295/6-296
Figure 6-99.	95000 Divide-By-N/Phase Detector	6-297
Figure 6-100.	95000 Divide-By-N/Phase Detector	6-301/6-302
Figure 6-101.	96000 Down Converter, Component Location	6-303
Figure 6-102.	96000 Down Converter	6-309/6-310
Figure 6-103.	97000 Up Converter, Component Location	6-311
Figure 6-104.	97000 Up Converter	6-313/6-314
Figure 6-105.	98000 88-100 Mhz VCO, Component Location	6-315
Figure 6-106.	98000 88-100 MHz VCO	6-319/6-320

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
10000	FRONT PANEL ASSY	7003-0154	CUSHMAN	CE-5100 SERIES
	LOG/SWEEP PANEL ASSY	7011-0038	CUSHMAN	CE-5110 ONLY
	CAPACITOR			
C 2	CAP-2700PF 5% 100V NPO MINTR CER	1005-0130	CENTRE	200-100-NPO-272J
C 3	CAP-.05UF +80-20% 500V Z5U CER DISC	1005-0052	SPRAGUE	5HK-S50
C 4	CAP-1000PF +100-0% 300V CER FEED-THRU	1005-0077	SPECTRUM	54-802-002 W/SOLDER
C 5	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
	DIODE			
CR 1	DIO-LT EMIT RED 5V SNAP-IN MT	1281-0113	DIALCO	559-0101-001
CR 2	DIO-LT EMIT RED 5V SNAP-IN MT	1281-0113	DIALCO	559-0101-001
CR 4	DIO-LT EMIT RED 5V SNAP-IN MT	1281-0113	DIALCO	559-0101-001
CR 5	DIO-LT EMIT GRN 5V SNAP-IN MT	1281-0145	DIALCO	559-0201-001
CR 6	DIO-LT EMIT GRN 5V SNAP-IN MT	1281-0145	DIALCO	559-0201-001
CR 7	DIO-LT EMIT YEL 5V SNAP-IN MT	1281-0146	DIALCO	559-0301-001
CR 8	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 9	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 10	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 11	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 12	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 13	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 14	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 15	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 16	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 17	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 18	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
	CONNECTOR			
J 2	CONN-BNC JACK RECT. PANEL MT.	2536-0010	KINGS	KC79-35
J 4	CONN-BNC JACK RECT. PANEL MT.	2536-0010	KINGS	KC79-35
J 5	CONN-BNC JACK RECT. PANEL MT.	2536-0010	KINGS	KC79-35
J 6	CONN-BNC JACK RECT. PANEL MT.	2536-0010	KINGS	KC79-35
J 7	CONN-BNC JACK RECT. PANEL MT.	2536-0010	KINGS	KC79-35
J 9	CONN-BNC JACK RECT. PANEL MT.	2536-0010	KINGS	KC79-35
	INDUCTOR			
L 1	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
	MIXER			
M 1	MTR-DC 500-0-500 UA FREQ	1402-0038	MODUTEC	TIW1-DVA-5H5
M 4	MTR-DC 0-500UA OUTPUT LEVEL	1402-0040	WESTON	C/E DWG
	RESISTOR			
R 1	POT-10K 20% 1/4W LOG 1/8 SFT CC	1203-0097		
R 3	POT-500K 10% 1/2W LIN 1/8SFT CC W/SPDT	1203-0076	ALLEN BRADLEY	C/E DWG 14M158
R 4	POT-10K 20% 1/4W LOG 1/8 SFT CC	1203-0097		
R 5	POT-10K 20% 1/4W LOG 1/8 SFT CC	1203-0097		
R 6	POT-10K 20% 3/4W LIN 1/8 SFT CERMET	1203-0080	CTS BERNE	X6P1313 SERIES VA305
R 8	POT-10K 10% 3/4W 20T CERMET TRMR	1215-0034	SPECTROL	43P103T000
R 9	SW-RTRY CONC 1 POLE 4 POS W/POT	1851-0122		
R 10	RES-13K 5% 1/4W CC	1066-1335	ALLEN BRADLEY	CB1335
R 11	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 12	RES-110K 1% 100PPM FILM	1075-0162	CAT. LIST	55-100

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 13	RES-360K 5% 1/4W CC	1066-3645	ALLEN BRADLEY	CB3645
R 14	RES-110K 1% 100PPM FILM	1075-0162	CAT. LIST	55-100
R 15	RES-56K 5% 1/4W CC	1066-5635	ALLEN BRADLEY	CB 3635
R 16	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 16	POT-2.5K/2.5K 10% LIN CERMET W/SW	1203-0118	BOURNS	86J3A-L36-A12R70A12
R 17	POT-2.5K/2.5K 10% LIN CERMET W/SW	1203-0118	BOURNS	86J3A-L36-A12R70A12
R 18	RES-110K 1% 100PPM FILM	1075-0162	CAT. LIST	55-100
R 19	RES-69.8K 1% 100PPM FILM	1075-0100	CAT.LIST	55-100
R 20	SW-RTRY CONC 2POLE 2POSN W/POT PNL MT	1851-0135	CTS KEENE	C/E DWG(X5P11903A)
R 21	RES-6.19K 1% 100PPM FILM	1075-0109	CAT.LIST	55-100
R 22	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 23	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 7A	POT-500K/500K 10% 1/8 SFT CERMET W/SW	1203-0098		
R 7B	POT-500K/500K 10% 1/8 SFT CERMET W/SW	1203-0098		
	SWITCH			
S 1	SW-RTRY 1 POLE 3 POSN PNL MT	1851-0138	CTS KEENE	C/E DWG
S 2	SW-RTRY CONC 1 POLE 4 POS W/POT	1851-0122		
S 3	SW-TOGGLE SPDT	1850-0008	C&K COMPONENTS	7101
S 4	SW-RTRY 3 POLE 7 POSN PNL MT	1851-0133	OAK INDUSTRIES	C/E DWG
S 6	SW-TOGGLE SPDT ON-OFF-ON ROUND HDL	1850-0036	C & K	7103,NUT STYLE 7760
S 7	SW-RTRY 5 POLE 8 POSN PNL MT	1851-0145	OAK INDUSTRIES	C/E DWG
S 8	SW-SPXT SUBMINI MON NO PB W/OVER TER	1852-0025	C&K COMPONENTS	8531-W/A7002
S 9	POT-500K 10% 1/2W LIN 1/8SFT CC W/SPDT	1203-0076	ALLEN BRADLEY	C/E DWG 14M158
S 10	SW-TOGGLE SPDT	1850-0008	C&K COMPONENTS	7101
S 11	POT-500K/500K 10% 1/8 SFT CERMET W/SW	1203-0098		
S 12	SW-TOGGLE SPDT	1850-0008	C&K COMPONENTS	7101
S 13	SW-TOGGLE 4P3P ON-OFF-ON RD HDL	1850-0042	ALCO SWITCH	MTA-406P
S 14	SW-THWL 4 SEC BCD CODE	1851-0137	CHERRY	C/E DWG (T50-34MD)
S 15	POT-2.5K/2.5K 10% LIN CERMET W/SW	1203-0118	BOURNS	86J3A-L36-A12R70A12
S 16	SW-RTRY CONC 2POLE 2POSN W/POT PNL MT	1851-0135	CTS KEENE	C/E DWG(X5P11903A)
S 17	SW-TOGGLE SPDT	1850-0008	C&K COMPONENTS	7101
S 18	SW-TOGGLE DPDT	1850-0014	C & K	7201

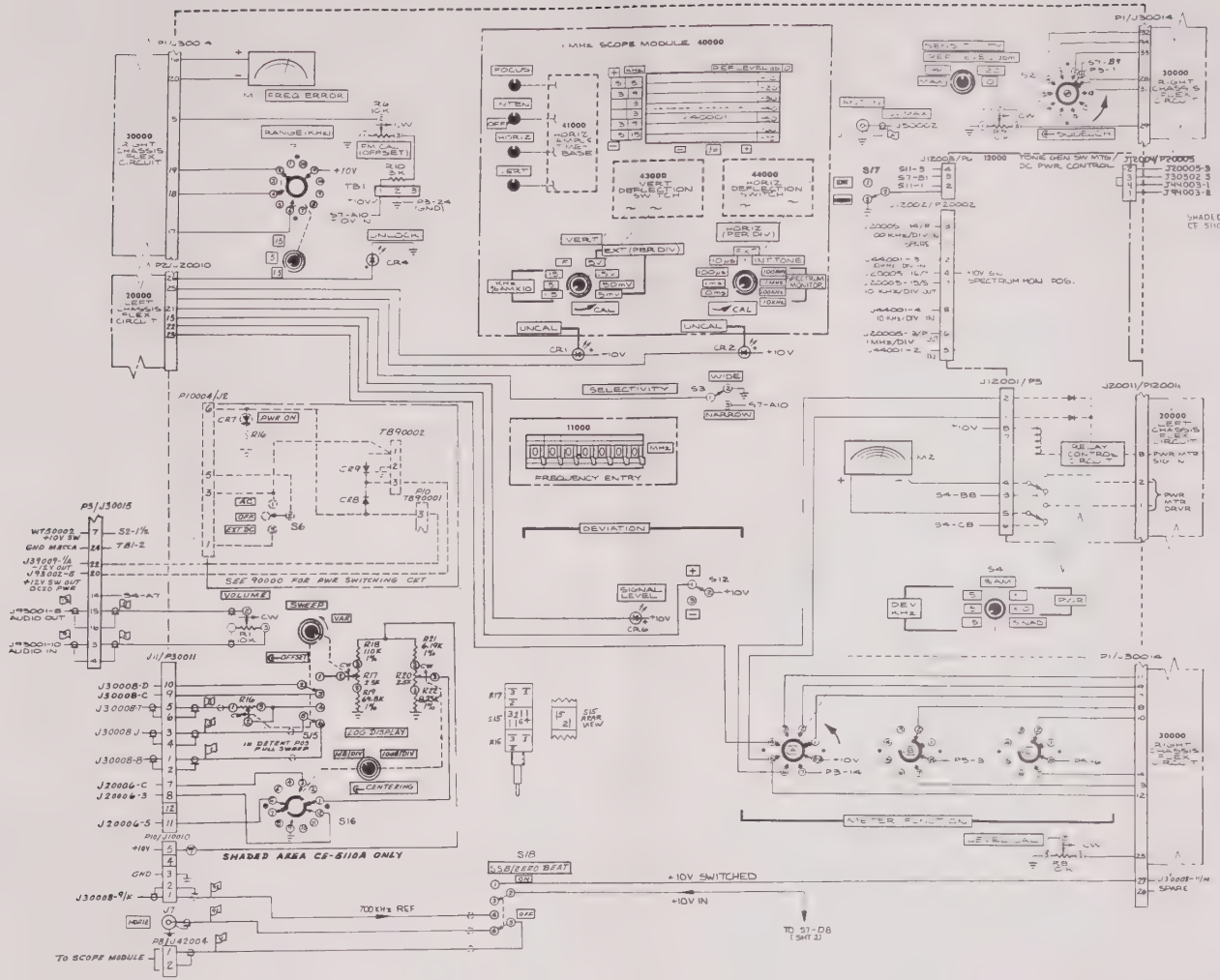
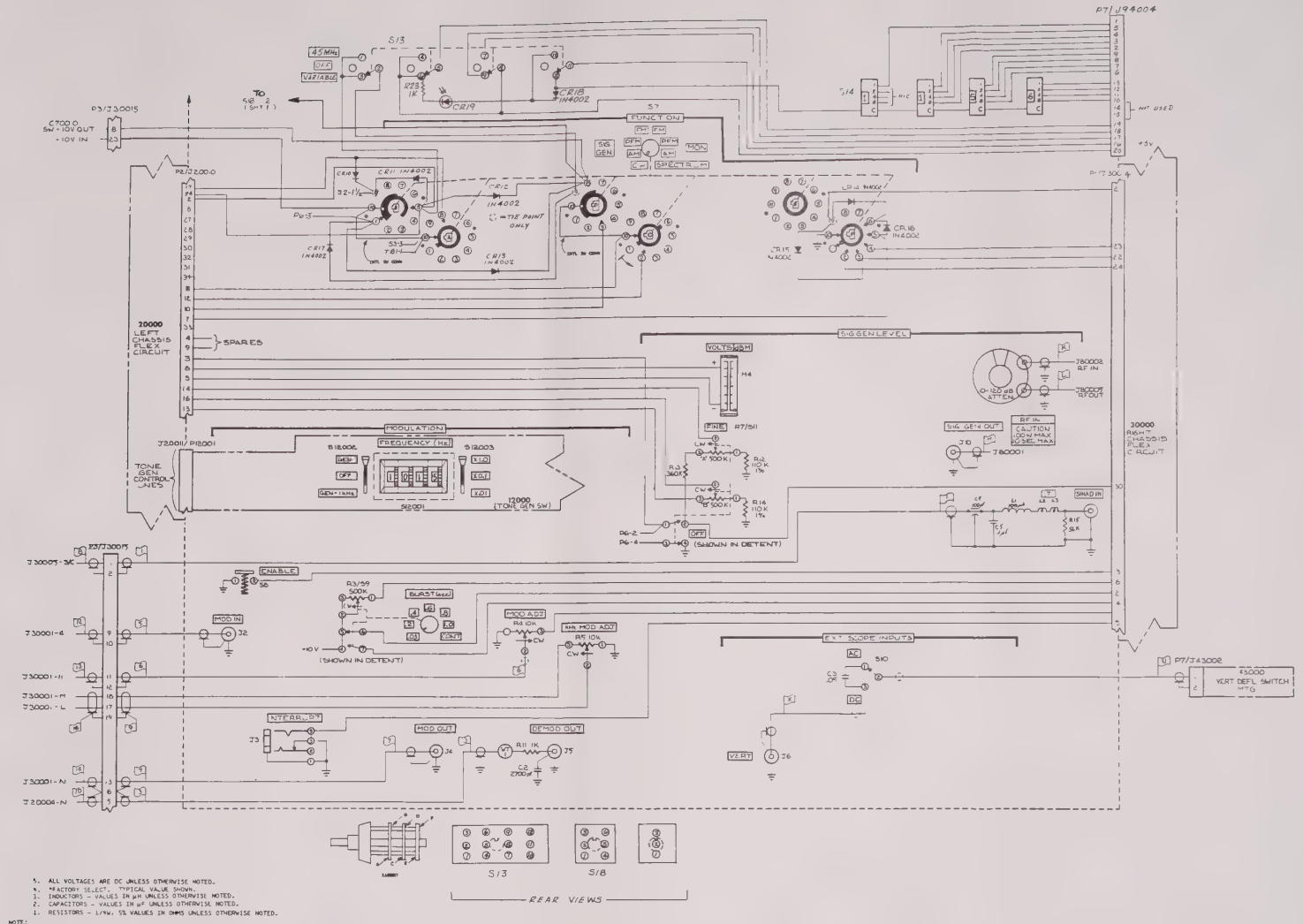
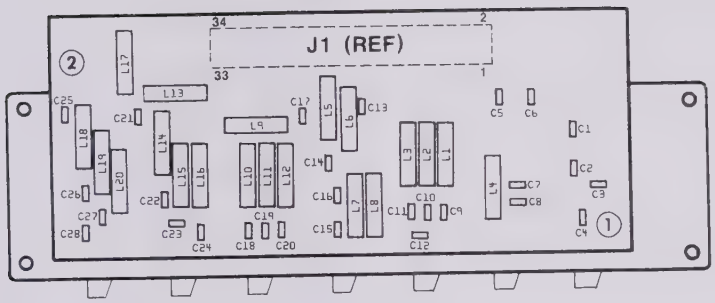


Figure 6-1. 10000 Front Panel Interconnect Diagram.

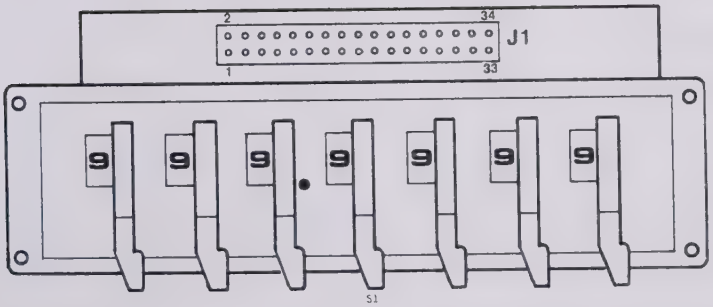


NOTE:
1. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
2. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS – VALUES IN μH UNLESS OTHERWISE NOTED.
4. CAPACITORS – VALUES IN μF UNLESS OTHERWISE NOTED.
5. RESISTORS – 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-1. 10000 Front Panel Interconnect Diagram. (Continued)



BACK SIDE

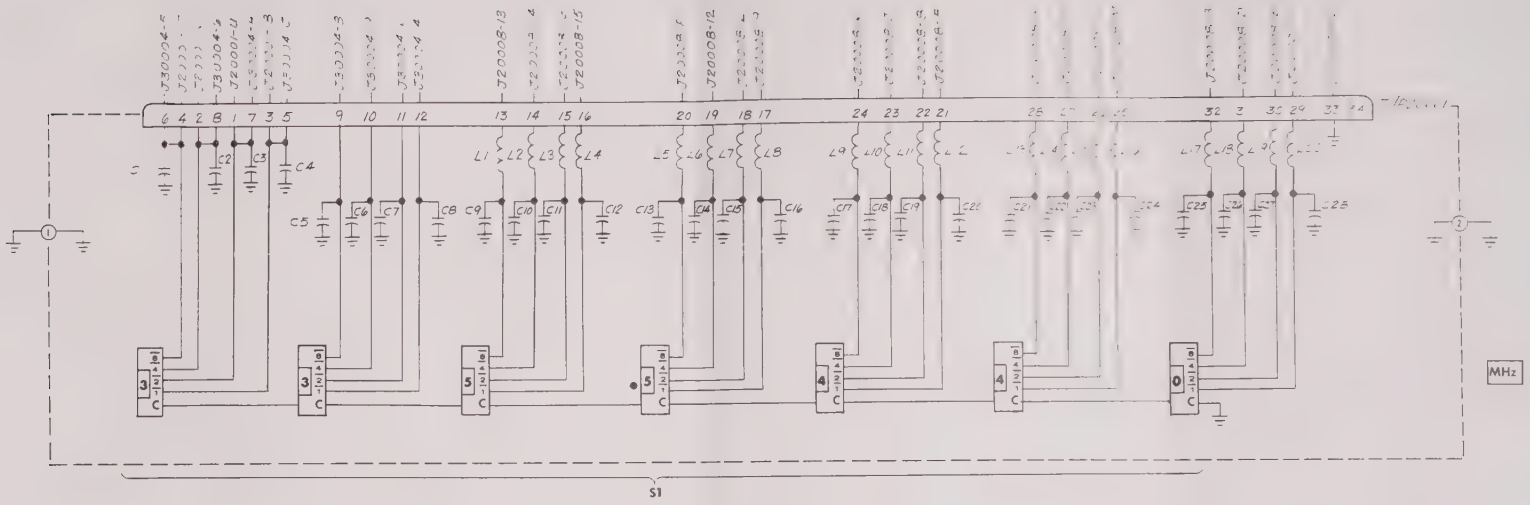


FRONT SIDE

Figure 6-2. 11000 RF Select Switch, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
11000	PCB ASSY - RF FREQ SELECT SW MTG	7001-0595	CUSHMAN	CE-46A, CE-50A-1*
	PRINTED CIRCUIT BOARD	1780-1074	CUSHMAN	*(/TG, & 5110A)
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 15	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 16	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 19	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 20	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 21	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 22	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 23	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 24	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 25	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 26	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 27	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 28	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
	CONNECTOR			
J 1	CONN-34(2X17)CONT STR PCB MT JK	2535-0154	SPECTRA-STRIP	800-579
	INDUCTOR			
L 1	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 2	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 3	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 4	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 5	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 6	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 7	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 8	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 9	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 10	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 11	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 12	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 13	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 14	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 15	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 16	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 17	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 18	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 19	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82
L 20	CH-390UH 10% RF MLD AXL.10DX.25L	1585-0088	DELEVAN ELECTRONICS	1025-82

CKT REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	SWITCH			
S 1	SW-LVRWL 7 SEC PCB MT	1851-0114		



NOTE:
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
6. ALL CAPACITORS-VALUES IN .01 uF UNLESS OTHERWISE NOTED.
7. ALL CHOKES-VALUES ARE 390 uH UNLESS OTHERWISE NOTED.

Figure 6-3. 11000 RF Select Switch Mounting.

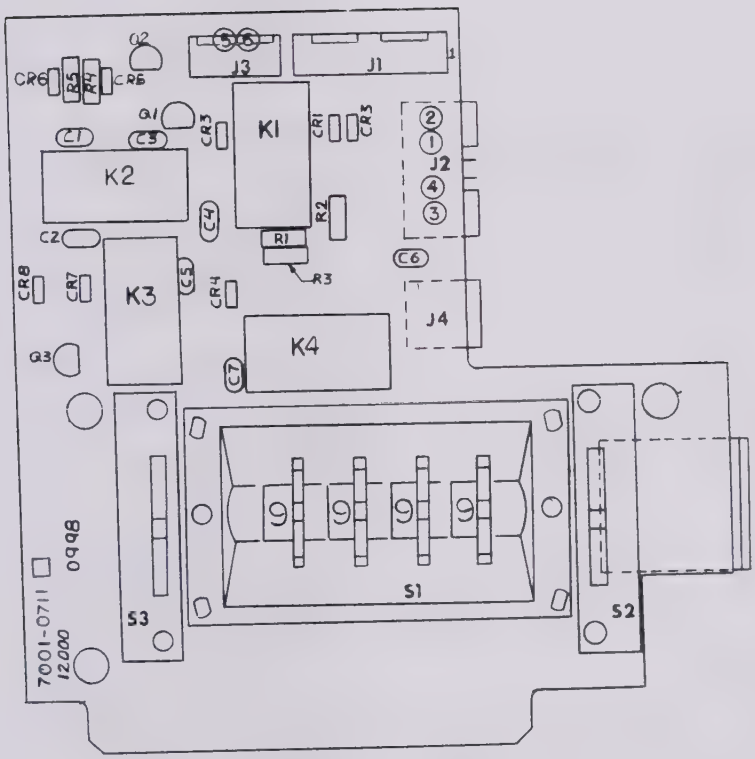
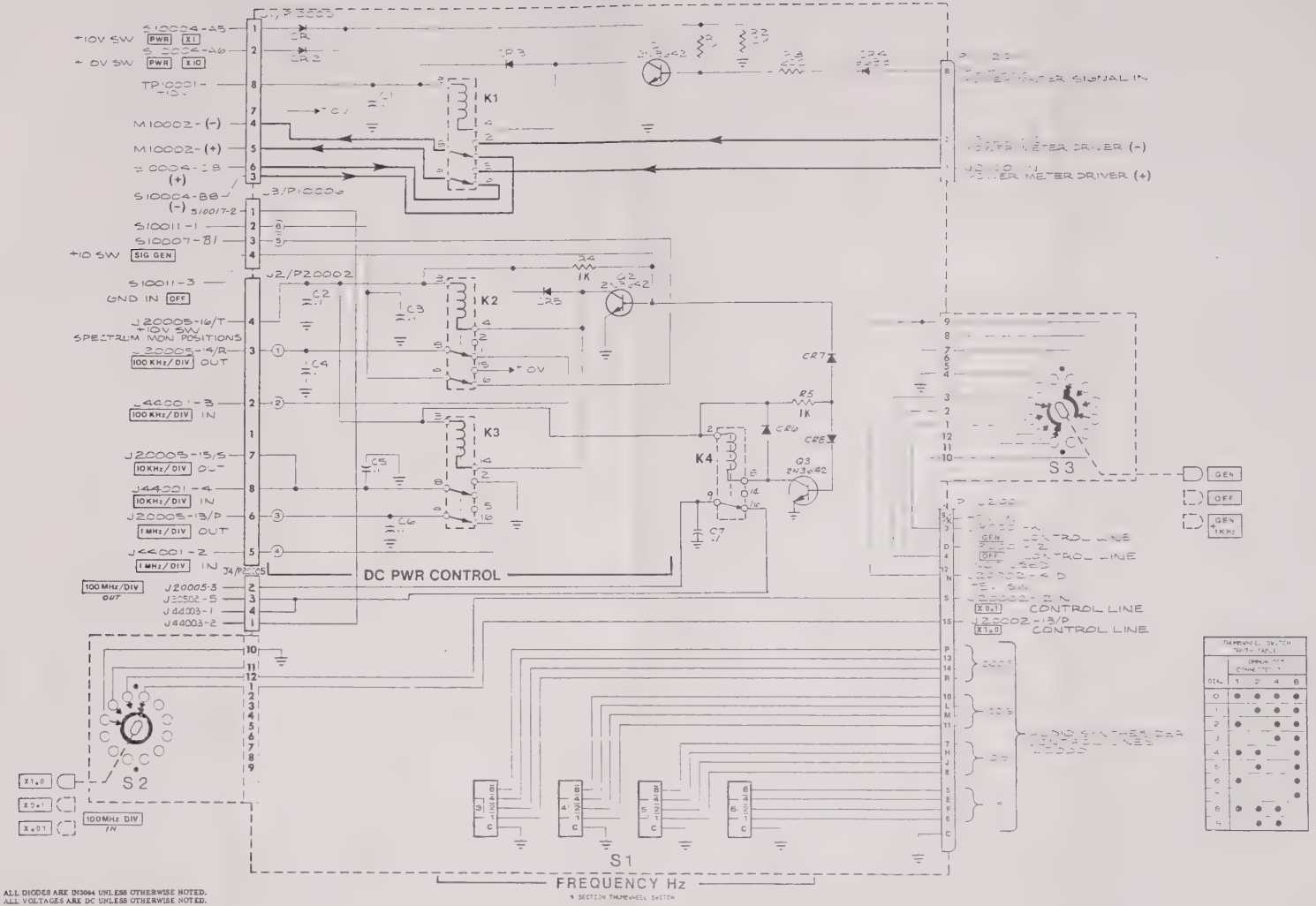


Figure 6-4 12000 Tone Generator Switch Mounting/DC Power, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
12000	PCB ASSY - TONE GEN SW MTG/DC PWR	7001-0711	CUSHMAN	CE-5110A ONLY
	PRINTED CIRCUIT BOARD	1780-1075	CUSHMAN	
	CAPACITOR			
C 1	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 2	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 3	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 4	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 5	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 6	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 7	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	CONNECTOR			
J 1	CONN-8 PIN .1SP STR UCG PCB MT JK	2535-0141	METHODE	1100-8-108-01
J 2	CONN-8 PIN .1SP RTANG LKG PCB MT JK	2535-0178		
J 3	CONN-4PIN .1SP STR LKG PCB MT JK	2535-0144	MOLEX INC	22-27-2041
J 4	CONN-4 PIN .1SP RTANG LKG PCB MT JK	2535-0174	METHODE	1100-9-104-01
	RELAY			
K 1	RLY-DPDT 12VC COIL 2 FORM C PCB MT	1313-0029	AROMAT CORP.	HB2-12V
K 2	RLY-DPDT 12VC COIL 2 FORM C PCB MT	1313-0029	AROMAT CORP.	HB2-12V
K 3	RLY-DPDT 12VC COIL 2 FORM C PCB MT	1313-0029	AROMAT CORP.	HB2-12V
K 4	RLY-SPDT 12VDC COIL FORM C PCB MT	1313-0026	ARROW-M	HB1-DC12V
	TRANSISTOR			
Q 1	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
Q 2	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
Q 3	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
	RESISTOR			
R 1	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 2	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 3	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 4	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 5	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
	SWITCH			
S 1	SW ASSY-4 SELECTOR THUMBWHEEL	1851-0028	OAK	C/E DWG
S 2	SW-LEVER 1P 3 POS PCB MOUNT	1851-0094	OAK	C/E DWG
S 3	SW-LEVER 2 POLE 3 POSN PCB MT	1851-0115	OAK	C/E DWG



NOTE:
6. ALL DIODES ARE IN3064 UNLESS OTHERWISE NOTED.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN uH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN uF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-5. 12000 Tone Generator Switch Mounting/DC Power.

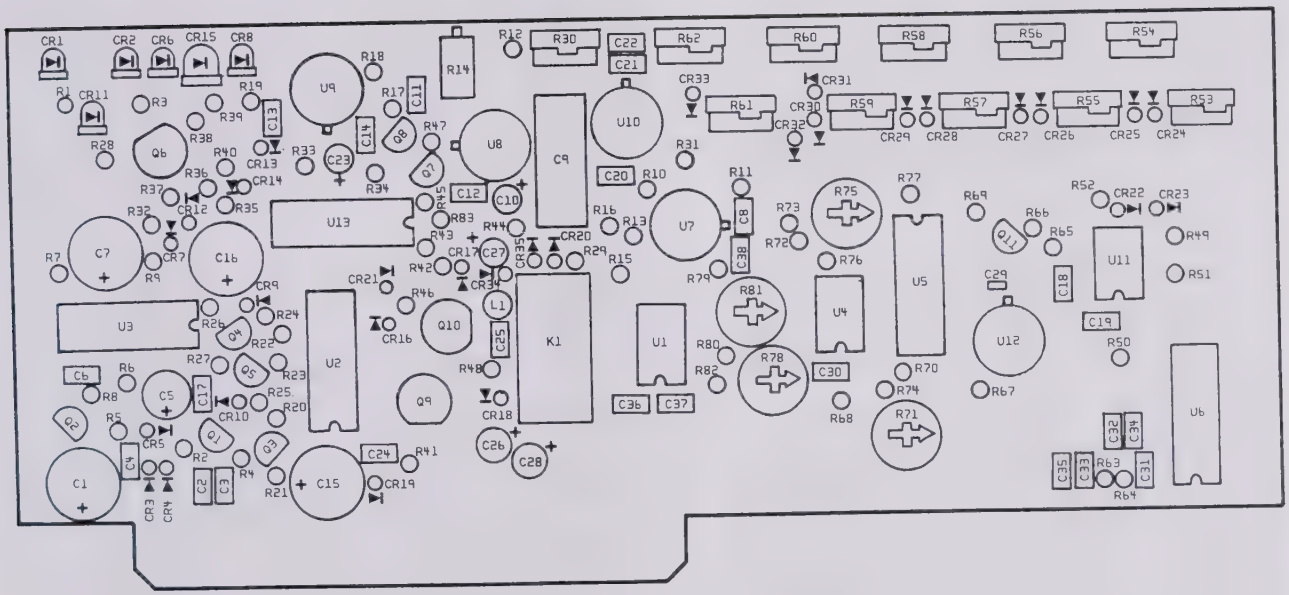


Figure 6-6. 21000 ALC/Squelch/DC Control, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
21000	PCB ASSY - ALC/SQELCH/DC CONTROL	7001-0600	CUSHMAN	CE-50 FAMILY*
	PRINTED CIRCUIT BOARD	1780-1077	CUSHMAN	*(EXCEPT CE-45A)
	CAPACITOR			
C 1	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 2	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 3	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 4	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 5	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 8	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 9	CAP-1UF 10% 100V RDL MET-POLYESTER	1008-0100	PLESSEY	60H105K100
C 10	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 11	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 12	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 13	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 14	CAP-33PF 5% 500V THIN DIP MICA	1004-0006	CORNELL DUBILIER	CD6ED330J
C 15	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 16	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 17	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 18	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 19	CAP-56PF 10% 100V NPO MINTR CER	1005-0109	TUSONIX	8121-100-C0G0-560K
C 20	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 21	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 22	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 23	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 24	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 25	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 26	CAP-2.2UF 10% 35V RDL TANT	1011-0001	SPRAGUE	196D225X9035JA1
C 27	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 28	CAP-2.2UF 10% 35V RDL TANT	1011-0001	SPRAGUE	196D225X9035JA1
C 29	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 30	CAP-150PF 10% 100V NPO MINTR CER	1005-0108	ERIE	8121-100-C0G0-151K
C 31	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 32	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 33	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 34	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 35	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 36	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 37	CAP-33PF 5% 500V THIN DIP MICA	1004-0006	CORNELL DUBILIER	CD6ED330J
C 38	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
	DIODE			
CR 1	DIO-LT EMIT RED 1.6V W ANG T1	1281-0137	HP	5082-4484
CR 2	DIO-LT EMIT RED 1.6V W ANG T1	1281-0137	HP	5082-4484
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-LT EMIT RED 1.6V W ANG T1	1281-0137	HP	5082-4484
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-LT EMIT RED 1.6V W ANG T1	1281-0137	HP	5082-4484
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 10	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 11	DIO-LT EMIT RED 1.6V W ANG T1	1281-0137	HP	5082-4484
CR 12	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 13	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
CR 14	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 15	DIO-LT EMIT GRN 2V M AMG W/MTG GROM	1281-0096	CHICAGO MINIATURE	CM4-384B
CR 16	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 17	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 18	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 19	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 20	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 21	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 22	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 23	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 24	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 25	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 26	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 27	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 28	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 29	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 30	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 31	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 32	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 33	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 34	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 35	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	RELAY			
K 1	RLY-SPDT 12VDC COIL FORM C PCB MT	1313-0026	ARROW-M	HB1-DC12V
	INDUCTOR			
L 1	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
	TRANSISTOR			
Q 1	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 2	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 3	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 4	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 5	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 6	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
Q 7	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 8	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 9	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
Q 10	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
Q 11	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
	RESISTOR			
R 1	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215
R 2	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 3	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 4	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 5	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 6	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 7	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 8	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 9	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 10	RES-33.2K 1% 100PPM FILM	1075-0098	CAT.LIST	55-100
R 11	RES-20K 1% 100PPM FILM	1075-0096	CAT.LIST	55-100
R 12	RES-15K 1% 100PPM FILM	1075-0081	CAT.LIST	55-100

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 13	RES-100K 1% 100PPM FILM	1075-0105	CAT.LIST	55-100
R 14	POT-20K 10% 1/2W 25T CERMET TRMR	1215-0048	BOURNS	3299X-1-203
R 15	RES-430K 5% 1/4W CC	1066-4345	ALLEN BRADLEY	BB4345
R 16	RES-390K 5% 1/4W CC	1066-3945	ALLEN BRADLEY	CB 3945
R 17	RES-24K 5% 1/4W CC	1066-2435	ALLEN BRADLEY	CB2435
R 18	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 19	RES-680 OHM 5% 1/4W CC	1066-6815	ALLEN BRADLEY	CB 6815
R 20	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 21	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 22	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 23	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 24	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 25	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 26	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 27	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 28	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 29	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 30	POT-20K 20% 1/2W 1T CERMET TRMR	1215-0044	BECKMAN	91AR20K
R 31	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 32	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 33	RES-330K 5% 1/4 CC	1066-3345	ALLEN BRADLEY	CB3345
R 34	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 35	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 36	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 37	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 38	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 39	RES-680 OHM 5% 1/4W CC	1066-6815	ALLEN BRADLEY	CB 6815
R 40	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 41	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 42	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 43	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 44	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 45	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 46	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 47	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 48	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 49	RES-510K 5% 1/4W CC	1066-5145	ALLEN BRADLEY	CB 5145
R 50	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 51	RES-510K 5% 1/4W CC	1066-5145	ALLEN BRADLEY	CB 5145
R 52	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 53	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 54	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 55	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 56	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 57	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 58	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 59	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 60	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 61	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 62	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 63	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 64	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 65	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 66	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 67	RES-100K 1% 100PPM FILM	1075-0105	CAT.LIST	55-100
R 68	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 69	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 70	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 71	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 72	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 73	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 74	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 75	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 76	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 77	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 78	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 79	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 80	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 81	POT-20K 20% 1/2W 1T CERMET TRMR	1215-0044	BECKMAN	91AR20K
R 82	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 83	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
	INTEGRATED CIRCUIT			
U 1	IC-LM308N OP AMPL 8 PIN	2025-0070	NATIONAL	LM308N
U 2	IC-74LS74 DUAL D POS &DGETRIGFFW/P&C	2025-0124	TEXAS INSTRUMENTS	SN74LS74N
U 3	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 4	IC-LM308N OP AMPL 8 PIN	2025-0070	NATIONAL	LM308N
U 5	IC-4066B 14 PIN DIP QUAD BILATERAL SW	2025-0193	MOTOROLA	MC14066BCP
U 6	IC-4028B 16 PIN DIP BCD-TO-DEC DCDR	2025-0195	MOTOROLA	MC14028BP
U 7	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 8	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 9	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 10	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 11	IC-LM308N OP AMPL 8 PIN	2025-0070	NATIONAL	LM308N
U 12	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 13	IC-4011 14PIN DIP QUAD 2-INP NAND GATE	2025-0203	MOTOROLA	MC14011BCP

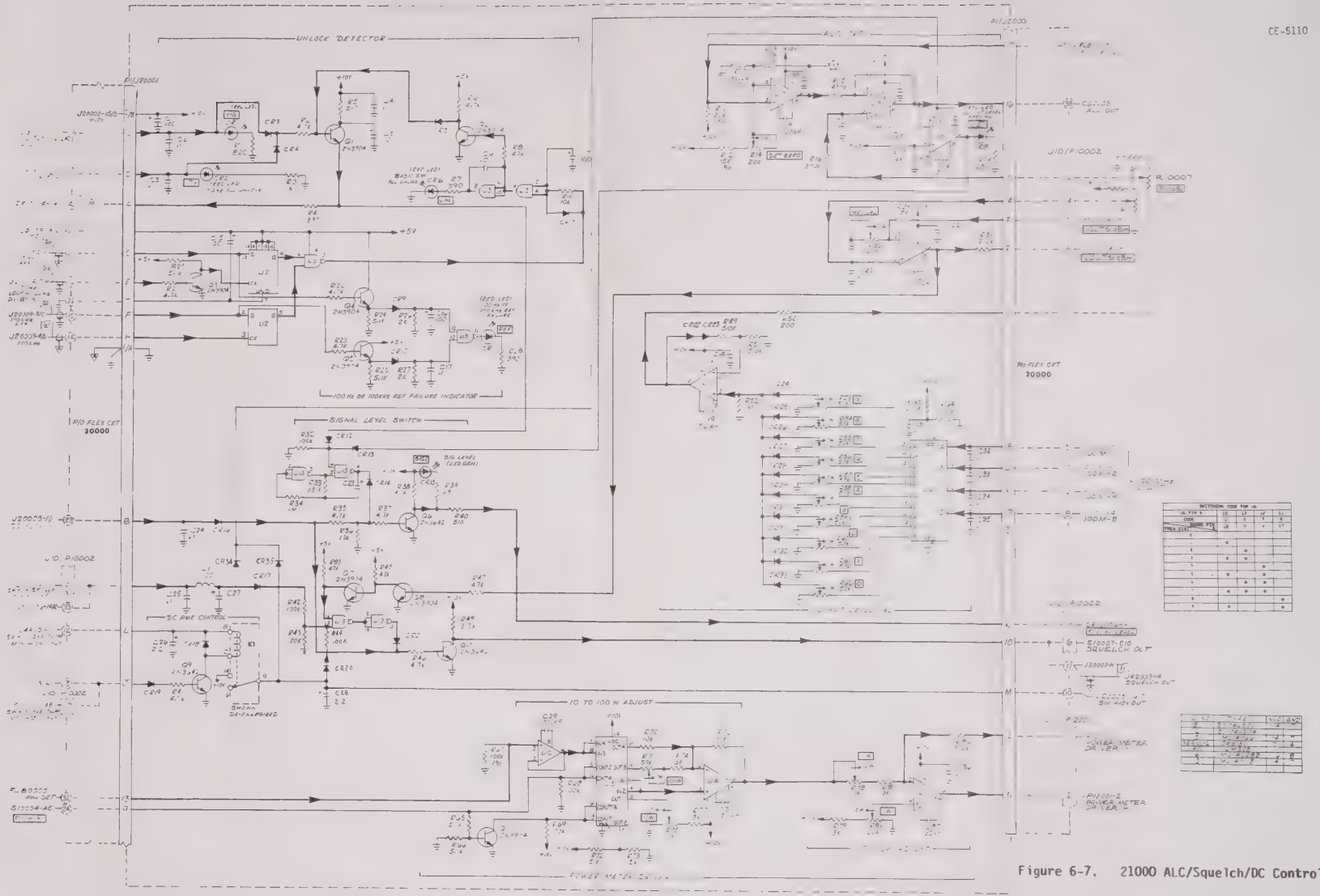


Figure 6-7. 21000 ALC/Squelch/DC Control.

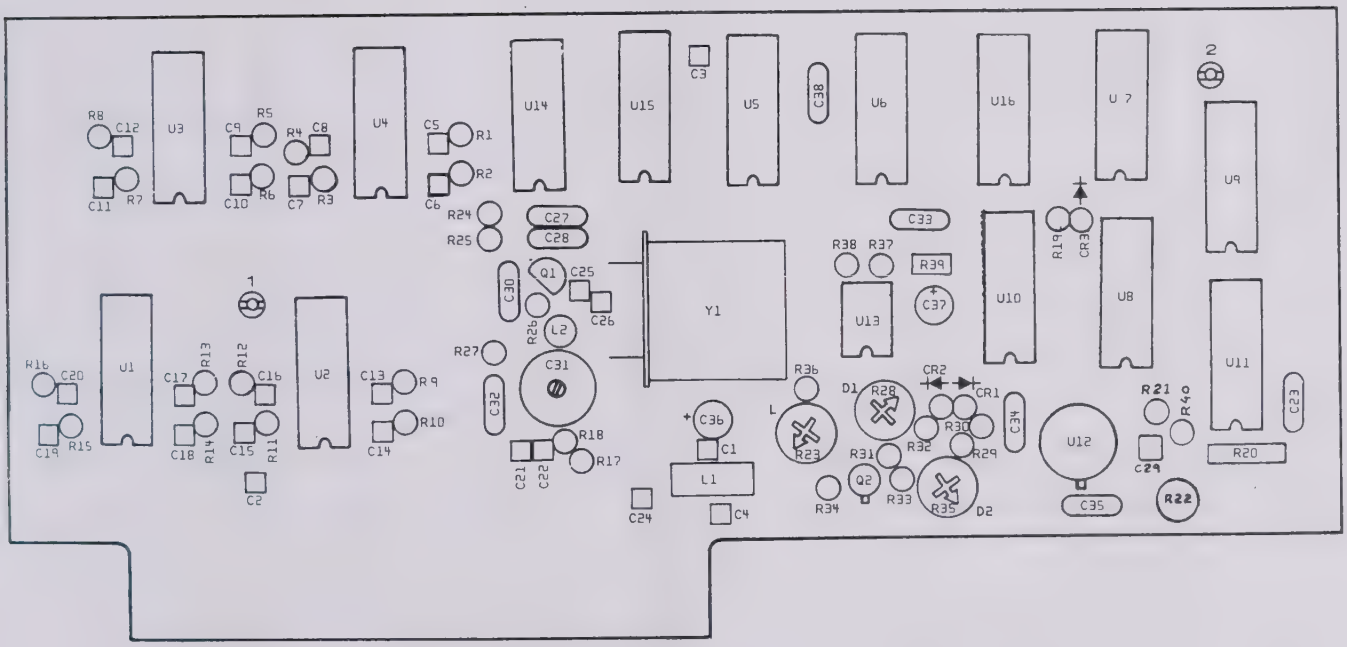
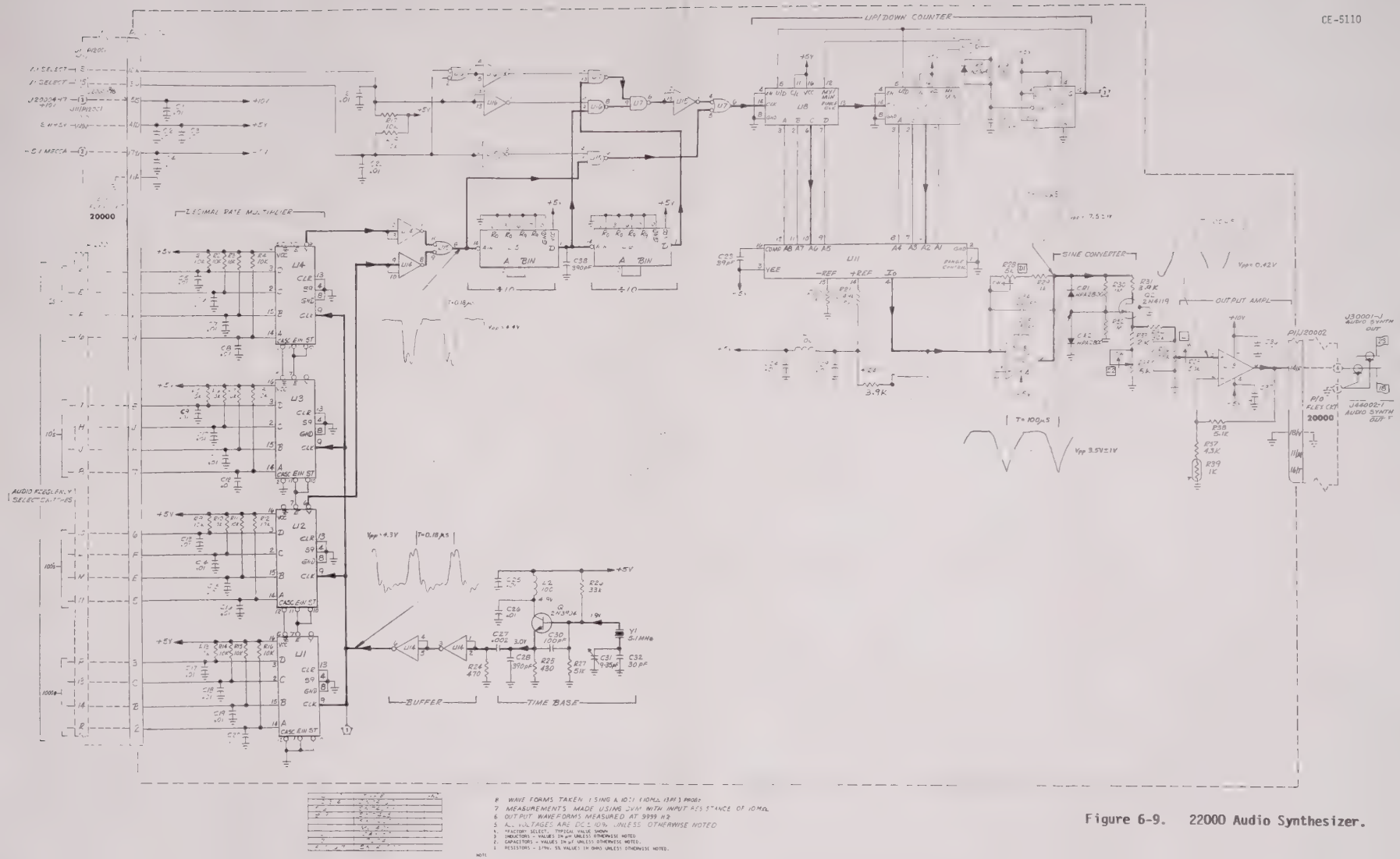


Figure 6-8 22000 Audio Synthesizer, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
22000	PCB ASSY - AUDIO SYNTHESIZER	7001-0485	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1035	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 5	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 15	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 16	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 19	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 20	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 21	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 22	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 23	CAP-39PF 2% 500V DIP MICA	1002-0054	ELMENCO	DM15-E-390G
C 24	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 25	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 26	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 27	CAP-.002UF 20% 500V Z5U CER DISC	1005-0003	TUSONIX	831-596-Z5U-202M
C 28	CAP-390PF 5% 500V DIP MICA	1002-0033	CORNELL DUBILIER	CD15FD391J
C 29	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 30	CAP-100PF 5% 500V DIP MICA	1002-0011	ELMENCO	DM15-F-101J
C 31	CAP-9-35PF 200V N650 V MT CER TRMR	1001-0006	ERIE	CV31D350
C 32	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 33	CAP-120PF 10% 100V NPO MINTR CER	1005-0110	ERIE	8121-100-C0G0-121K
C 34	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 35	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 36	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 37	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 38	CAP-390PF 5% 500V DIP MICA	1002-0033	CORNELL DUBILIER	CD15FD391J
	DIODE			
CR 1	DIO-HP2800 SI HOT CARR A1N 2PF 70PRV	1283-0001	HP	5082-2800
CR 2	DIO-HP2800 SI HOT CARR A1N 2PF 70PRV	1283-0001	HP	5082-2800
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	INDUCTOR			
L 1	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 2	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
	TRANSISTOR			
Q 1	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 2	XSTR-2N4119 SI T072 J-FET N-CHAN	1272-0078	NATIONAL	2N4119

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	RESISTOR			
R 1	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 2	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 3	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 4	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 5	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 6	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 7	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 8	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 9	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 10	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 11	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 12	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 13	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 14	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 15	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 16	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 17	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 18	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 19	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 20	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 21	RES-2.49K 1% 100PPM FILM	1075-0027	CAT.LIST	55-100
R 22	POT-2K 20% 1/2W 1T CERMET TRMR	1203-0072	BECKMAN	91A-R2K
R 23	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 24	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 25	RES-430 OHM 5% 1/4W CC	1066-4315	ALLEN BRADLEY	CB 4315
R 26	RES-33K 5% 1/4W CC	1066-3335	ALLEN BRADLEY	CB3335
R 27	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 28	POT-5K 20% 1/2W 1T CERMET TRMR	1203-0071	BECKMAN	91AR5K
R 29	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 30	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 31	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 32	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 33	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 34	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 35	POT-5K 20% 1/2W 1T CERMET TRMR	1203-0071	BECKMAN	91AR5K
R 36	RES-33K 5% 1/4W CC	1066-3335	ALLEN BRADLEY	CB3335
R 37	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 38	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 39	THMS-1K 10% 3.5MW RDL DISC	1253-0002	VECO	31E2
R 40	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
	INTEGRATED CIRCUIT			
U 1	IC-SN74167N SYN DECADE RATE MULTIPLIER	2025-0097	TEXAS INSTRUMENTS	SN74167N
U 2	IC-SN74167N SYN DECADE RATE MULTIPLIER	2025-0097	TEXAS INSTRUMENTS	SN74167N
U 3	IC-SN74167N SYN DECADE RATE MULTIPLIER	2025-0097	TEXAS INSTRUMENTS	SN74167N
U 4	IC-SN74167N SYN DECADE RATE MULTIPLIER	2025-0097	TEXAS INSTRUMENTS	SN74167N
U 5	IC-SN74LS90N DECADE COUNTER	2025-0113	TI	SN74LS90N
U 6	IC-SN74LS90N DECADE COUNTER	2025-0113	TI	SN74LS90N
U 7	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 8	IC-SN74LS191N SYN UP/DOWN COUNTERS	2025-0115	TI	SN74LS191N
U 9	IC-SN74LS191N SYN UP/DOWN COUNTERS	2025-0115	TI	SN74LS191N
U 10	IC-SN74LS73N DUAL J-K FLIP FLOP	2025-0110	TI	SN74LS73N
U 11	IC-MC1408L 7D-TO-A CONVERTER	2025-0089	MOTOROLA	MC1408L-7
U 12	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 13	IC-UA741CP	2025-0067	TI	UA741CP

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
U 14	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 15	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 16	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
	CRYSTAL			
Y 1	XTAL-5.1 MHZ	2035-0022	NORTHERN ENG. LABS	C/E DWG



NOTE
8. WAVE FORMS TAKEN USING A 10:1 (10MΩ 13PF) PROBE
7. MEASUREMENTS MADE USING DVM WITH INPUT RESISTANCE OF 10MΩ
6. OUTPUT WAVEFORMS MEASURED AT 9999 HZ
5. ALL VOLTAGES ARE DC ± 10% UNLESS OTHERWISE NOTED
4. *FACTORY SELECT. TYPICAL VALUE SHOWN
3. INDUCTORS = VALUES IN μH UNLESS OTHERWISE NOTED
2. CAPACITORS = VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS = 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-9. 22000 Audio Synthesizer.

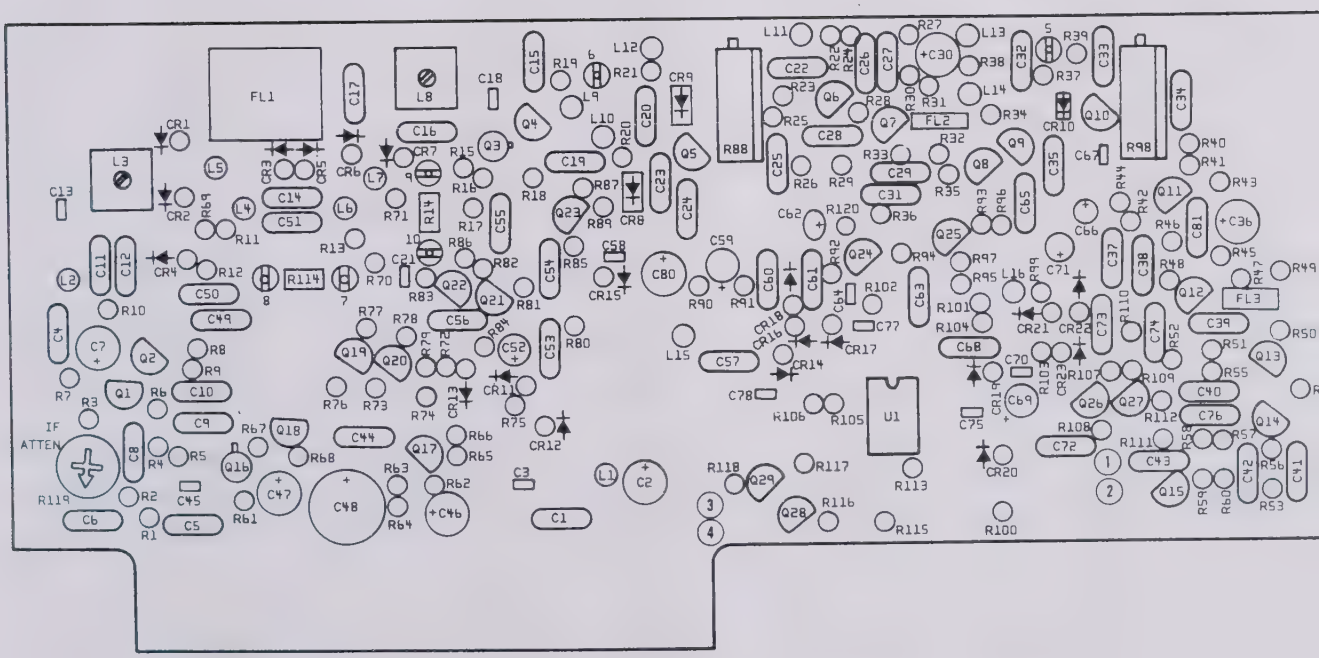


Figure 6-10. 23000 10.7 MHz IF, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
23000	PCB ASSY - 10.7 MHZ IF	7001-0574	CUSHMAN	CE-50 FAMILY *
	PRINTED CIRCUIT BOARD	1780-1060	CUSHMAN	*(EXCEPT CE-45A)
	CAPACITOR			
C 1	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 2	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 3	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 4	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 5	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 6	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 7	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 8	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 9	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 10	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 11	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 12	CAP-56PF 5% 500V DIP MICA	1002-0019	ELMENCO	DM15-E-560J
C 13	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 14	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 15	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 16	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 17	CAP-68PF 5% 500V DIP MICA	1002-0013	ELMENCO	DM15-E-680J
C 18	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 19	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 20	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 21	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 22	CAP-20PF 5% 500V DIP MICA	1004-0008	CORNELL DUBILIER	CD10ED200J
C 23	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 24	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 25	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 26	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 27	CAP-20PF 5% 500V DIP MICA	1004-0008	CORNELL DUBILIER	CD10ED200J
C 28	CAP-560PF 5% 300V DIP MICA	1002-0037	SANGAMO	D155F561
C 29	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 30	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 31	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 32	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 33	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 34	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 35	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 36	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 37	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 38	CAP-560PF 5% 300V DIP MICA	1002-0037	SANGAMO	D155F561
C 39	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 40	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 41	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 42	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 43	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 44	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 45	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 46	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 47	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 48	CAP-100UF -10-75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 49	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 50	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 51	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 52	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 53	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C 54	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 55	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 56	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 57	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 58	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 59	CAP-47UF 10% 6V AXL TANT	1011-0005	SPRAGUE	150D476X9006B2
C 60	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 61	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 62	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 63	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 64	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 65	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 66	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 67	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 68	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 69	CAP-15UF 10% 20V AXL TANT	1011-0004	SPRAGUE	150D156X9020B
C 70	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 71	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 72	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 73	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 74	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 75	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 76	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 77	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 78	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 80	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 81	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-MPN3401 SI PIN SW 35PRV .4W	1281-0050	MOTOROLA	MPN3401
CR 9	DIO-MPN3401 SI PIN SW 35PRV .4W	1281-0050	MOTOROLA	MPN3401
CR 10	DIO-MPN3401 SI PIN SW 35PRV .4W	1281-0050	MOTOROLA	MPN3401
CR 11	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
CR 12	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
CR 13	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 14	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 15	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
CR 16	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
CR 17	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
CR 18	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
CR 19	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 20	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 21	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
CR 22	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
CR 23	DIO-G633 GE SIG D07 1.5PF 40PRV	1282-0005	ITT	C/E DWG G633
	FILTER			
FL 1	FLTR-XTAL 10.7MHZ 3DB BW 22KHZ	1040-0041	PIEZO	C/E DWG
FL 2	FLTR-CER 10.7 MHZ 3DB BW 280 KHZ	1040-0043	MURATA CORP.	10.70MHZ RED ONLY
FL 3	FLTR-CER 10.7 MHZ 3DB BW 280 KHZ	1040-0043	MURATA CORP.	10.70MHZ RED ONLY

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	INDUCTOR			
L 1	CH-10UH 10% RF MLD AXL .16DX.38L	1585-0016	DELEVAN	1537-36
L 2	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 3	COIL 3.9 MHZ	1596-0104		
L 4	CH-1000UH 10% RF MLD AXL.10DX.25L	1585-0085	DELEVAN	1025-92
L 5	CH-1000UH 10% RF MLD AXL.10DX.25L	1585-0085	DELEVAN	1025-92
L 6	CH-1000UH 10% RF MLD AXL.10DX.25L	1585-0085	DELEVAN	1025-92
L 7	CH-1000UH 10% RF MLD AXL.10DX.25L	1585-0085	DELEVAN	1025-92
L 8	COIL 3.9 MHZ	1596-0104		
L 9	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 10	CH-470UH 10% RF MLD AXL.10DX.25L	1585-0086	DELEVAN	1025-84
L 11	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 12	CH-470UH 10% RF MLD AXL.10DX.25L	1585-0086	DELEVAN	1025-84
L 13	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 14	CH-470UH 10% RF MLD AXL.10DX.25L	1585-0086	DELEVAN	1025-84
L 15	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 16	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
	TRANSISTOR			
Q 1	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 2	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 3	XSTR-2N4416 SI TO 72 J-FET N-CHAN	1272-0048	INTERSIL	2N4416
Q 4	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 5	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 6	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 7	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 8	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 9	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 10	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 11	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 12	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 13	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 14	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 15	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 16	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 17	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 18	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 19	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 20	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 21	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 22	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 23	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 24	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 25	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 26	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 27	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 28	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 29	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
	RESISTOR			
R 1	RES-680 OHM 5% 1/4W CC	1066-6815	ALLEN BRADLEY	CB 6815
R 2	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 3	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 4	RES-6.8K 5% 1/4W CC	1066-6825	ALLEN BRADLEY	CB 6825
R 5	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 6	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 7	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 8	RES-1.3K 5% 1/4W CC	1066-1325	ALLEN BRADLEY	CB1325
R 9	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 10	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 11	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 12	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 13	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 14	RES-18K 5% 1/4W CC	1066-1835	ALLEN BRADLEY	CB1835
R 15	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 16	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 17	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 18	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 19	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 20	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 21	RES-360 OHM 5% 1/4W CC	1066-3615	ALLEN BRADLEY	CB3615
R 22	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 23	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 24	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 25	RES-91 OHM 5% 1/4W CC	1066-9105	ALLEN BRADLEY	CB 9105
R 26	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 27	RES-18K 5% 1/4W CC	1066-1835	ALLEN BRADLEY	CB1835
R 28	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 29	RES-160 OHM 5% 1/4W CC	1066-1615	ALLEN BRADLEY	CB1615
R 30	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 31	RES-36K 5% 1/4W CC	1066-3635	ALLEN BRADLEY	CB3635
R 32	RES-360 OHM 5% 1/4W CC	1066-3615	ALLEN BRADLEY	CB3615
R 33	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 34	RES-1.6K 5% 1/4W CC	1066-1625	ALLEN BRADLEY	CB1625
R 35	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 36	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 37	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 38	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 39	RES-1.3K 5% 1/4W CC	1066-1325	ALLEN BRADLEY	CB1325
R 40	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 41	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 42	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 43	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 44	RES-91 OHM 5% 1/4W CC	1066-9105	ALLEN BRADLEY	CB 9105
R 45	RES-18K 5% 1/4W CC	1066-1835	ALLEN BRADLEY	CB1835
R 46	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 47	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 48	RES-160 OHM 5% 1/4W CC	1066-1615	ALLEN BRADLEY	CB1615
R 49	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 50	RES-360 OHM 5% 1/4W CC	1066-3615	ALLEN BRADLEY	CB3615
R 51	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 52	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 53	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 54	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 55	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 56	RES-1.2K 5% 1/4W CC	1066-1225	ALLEN BRADLEY	CB1225
R 57	RES-24K 5% 1/4W CC	1066-2435	ALLEN BRADLEY	CB2435
R 58	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 59	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 60	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 61	RES-560K 5% 1/4W CC	1066-5645	ALLEN BRADLEY	CB 5645
R 62	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 63	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 64	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 65	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
R 66	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 67	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 68	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 69	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 70	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 71	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 72	RES-56K 5% 1/4W CC	1066-5635	ALLEN BRADLEY	CB 3635
R 73	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 74	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 75	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 76	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 77	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 78	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 79	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 80	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 81	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 82	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 83	RES-75 OHM 5% 1/4W CC	1066-7505	ALLEN BRADLEY	CB 7505
R 84	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 85	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 86	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 87	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 88	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 89	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 90	RES-1.6K 5% 1/4W CC	1066-1625	ALLEN BRADLEY	CB1625
R 91	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 92	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 93	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 94	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 95	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 96	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 97	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 98	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 99	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 100	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 101	RES-27K 5% 1/4W CC	1066-2735	ALLEN BRADLEY	CB2735
R 102	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 103	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 104	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 105	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 106	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 107	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 108	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 109	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 110	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 111	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 112	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 113	RES-5.6MEG 5% 1/4W CC	1066-5655	ALLEN BRADLEY	CB 5655
R 114	RES-3.3 OHM 5% 1/4W CC	1066-0006	ALLEN BRADLEY	CB33G5
R 115	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 116	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 117	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 118	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 119	POT-500 OHM 20% 1/2W 1T CERMET TRMR	1215-0042	BECKMAN	91AR500
R 120	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
	INTEGRATED CIRCUIT			
U 1	IC-CA 3140E 8 PIN DIP OP AMPL	2025-0237		

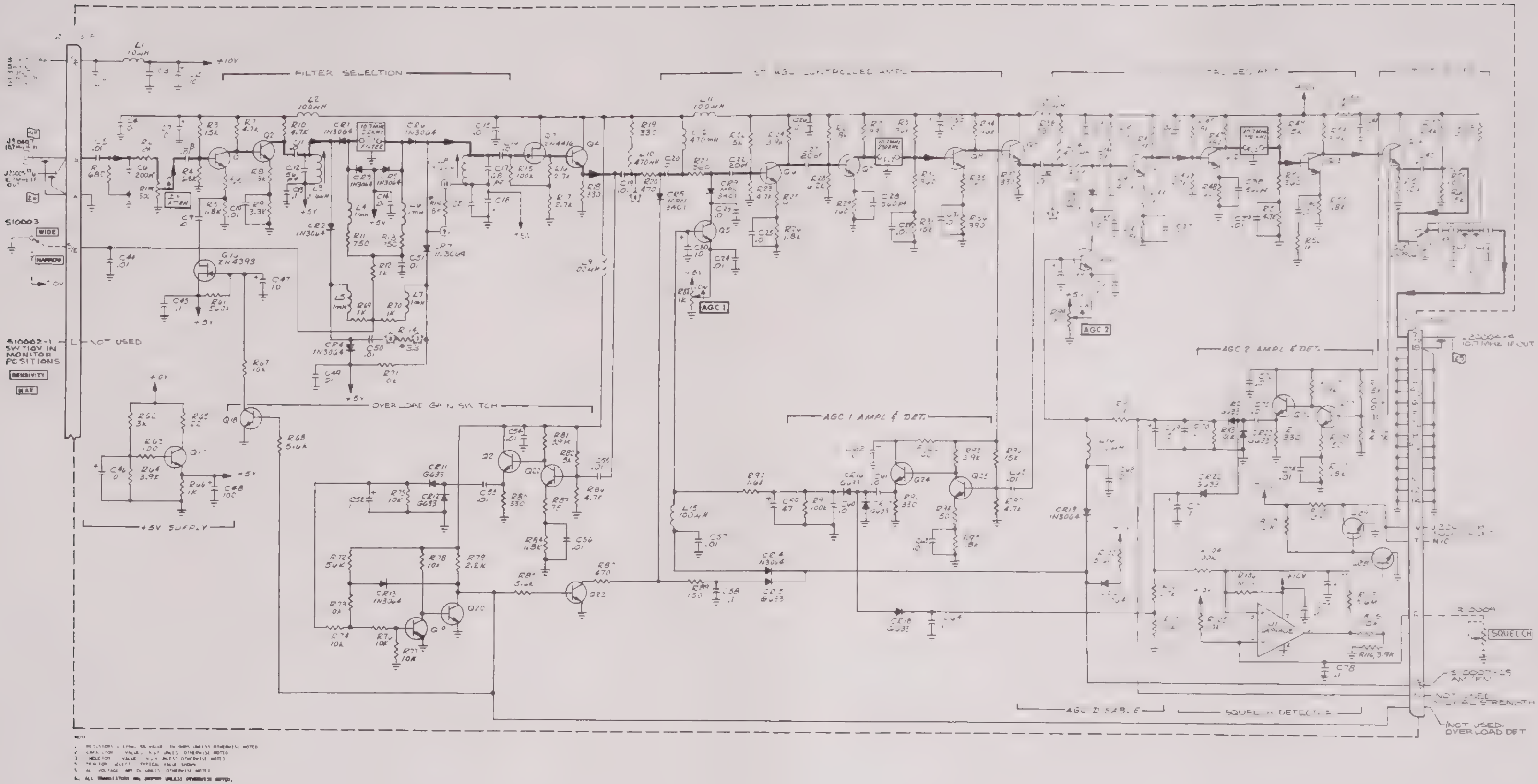


Figure 6-11. 23000 10.7 MHz IF.

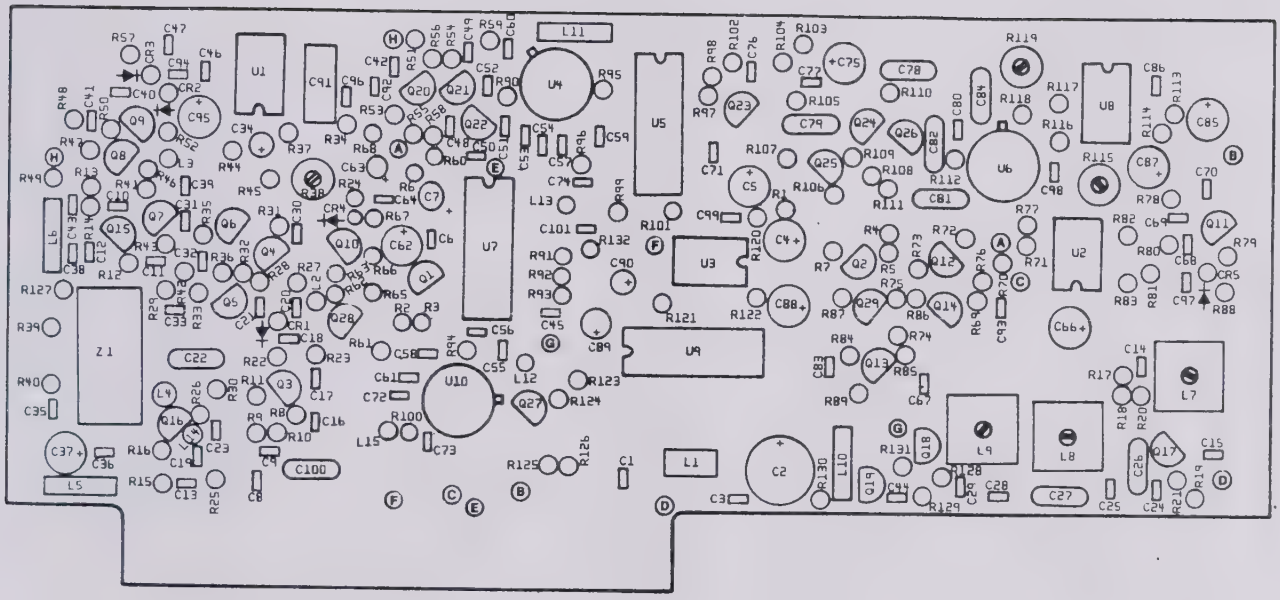


Figure 6-12. 24000 FM/AM Detector No.1, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
24000	PCB ASSY - FM/AM DETECTOR NO. 1	7601-0596	CUSHMAN	CE-50A, -1, /TG
	PRINTED CIRCUIT BOARD	1780-1031	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 5	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 15	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 16	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 19	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 20	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 21	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 22	CAP-82PF 5% 500V DIP MICA	1002-0020	ELMENCO	DM15-E-820J
C 23	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 24	CAP-820 PF 5% 100V NPO MINTR CER	1005-0126	CENTRE	200-100-NPO-821J
C 25	CAP-820 PF 5% 100V NPO MINTR CER	1005-0126	CENTRE	200-100-NPO-821J
C 26	CAP-18PF 5% 500V DIP MICA	1002-0014	ELMENCO	DM15-C-180J
C 27	CAP-33PF 5% 500V DIP MICA	1002-0024	ELMENCO	DM15-E-220J
C 28	CAP-1500PF 5% 100V NPO MINTR CER	1005-0128	CENTRE	200-100-NPO-152J
C 29	CAP-2000PF 5% 100V NPO MINTR CER	1005-0129	CENTRE	200-100-NPO-202J
C 30	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 31	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 32	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 33	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 34	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 35	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 36	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 37	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 38	CAP-2700PF 5% 100V NPO MINTR CER	1005-0130	CENTRE	200-100-NPO-272J
C 39	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 40	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 41	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 42	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 43	CAP-2700PF 5% 100V NPO MINTR CER	1005-0130	CENTRE	200-100-NPO-272J
C 44	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 45	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 46	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 47	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 48	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 49	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 50	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 51	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 52	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 53	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C 54	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 55	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 56	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 57	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 58	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 59	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 60	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 61	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 62	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 63	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 64	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 66	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 67	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 68	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 69	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 70	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 71	CAP-220PF 5% 100V NPO MINTR CER	1005-0134		
C 72	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 73	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 74	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 75	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 76	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 77	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 78	CAP-330PF 5% 500V DIP MICA	1002-0032	ELMENCO	DM15-F-331J
C 79	CAP-510PF 5% 500V DIP MICA	1002-0036	ELMENCO	DM15-F-511J
C 80	CAP-1200PF 5% 100V NPO MINTR CER	1005-0127	CENTRE	200-100-NPO-122J
C 81	CAP-24PF 5% 500V DIP MICA	1002-0051	ELMENCO	DM15-C-240J
C 82	CAP-180PF 5% 500V DIP MICA	1002-0005	ELMENCO	DM15-F-181J
C 83	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 84	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 85	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 86	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 87	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 88	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 89	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 90	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 91	CAP-.22UF 10% 100V RDL MET-MYLAR	1008-0091	ELECTROCUBE	232A1B224K
C 92	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 93	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRR0-221K
C 94	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 95	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP	10PC25
C 96	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 97	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 98	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 99	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 100	CAP-470PF 5% 500V DIP MICA	1002-0035	SANGAMO	D155F471
C 101	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
	DIODE			
CR 1	DIO-1N5767 SI PIN A1AH	1281-0075	NIPPON ELECT	1SV34
CR 2	DIO-HP2800 SI HOT CARR A1N 2PF 70PRV	1283-0001	HP	5082-2800
CR 3	DIO-HP2800 SI HOT CARR A1N 2PF 70PRV	1283-0001	HP	5082-2800
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	INDUCTOR			
L 1	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 2	CH-1000UH 10% RF MLD AXL.10DX.25L	1585-0085	DELEVAN	1025-92
L 3	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 4	CH-3.3UH 10% RF MLD AXL 16DX.38L	1585-0037	DELEVAN	1537-24
L 5	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 6	CH-15UH 10% RF MLD AXL .10DX.25L	1585-0051	DELEVAN	1025-48
L 7	COIL-VAR IF L45-1/5/44 LITZ/70T	1596-0290		
L 8	COIL-VAR IF L45-1/5/44 LITZ/70T	1596-0290		
L 9	COIL-VAR IF L45-1/5/44 LITZ/70T	1596-0290		
L 10	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 11	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 12	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 13	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 14	CH-.047X.138X 118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
L 15	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
	TRANSISTOR			
Q 1	XSTR-MPSD55 PNP SI T092 LOW PWR	1272-0092	MOTOROLA	MPS-D55
Q 2	XSTR-MPSD55 PNP SI T092 LOW PWR	1272-0092	MOTOROLA	MPS-D55
Q 3	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 4	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 5	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 6	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 7	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 8	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 9	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 10	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 11	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 12	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 13	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 14	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 15	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 16	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 17	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 18	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 19	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 20	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 21	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 22	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 23	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 24	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 25	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 26	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 27	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 28	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 29	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
	RESISTOR			
R 1	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 2	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 3	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 4	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 5	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 6	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 7	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 8	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 9	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 10	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 11	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 12	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 13	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 14	RES-430 OHM 5% 1/4W CC	1066-4315	ALLEN BRADLEY	CB 4315
R 15	RES-43 OHM 5% 1/4W CC	1066-4305	ALLEN BRADLEY	CB 4305
R 16	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215
R 17	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 18	RES-75K 5% 1/4W CC	1066-7535	ALLEN BRADLEY	CB 7535
R 19	RES-24K 5% 1/4W CC	1066-2435	ALLEN BRADLEY	CB2435
R 20	RES-9.1K 5% 1/4W CC	1066-9125	ALLEN BRADLEY	CB 9125
R 21	RES-1.6K 5% 1/4W CC	1066-1625	ALLEN BRADLEY	CB1625
R 22	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 23	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 24	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 25	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 26	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 27	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 28	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 29	RES-13.7K 1% 100PPM FILM	1075-0154	CAT. LIST	55-100
R 30	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 31	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 32	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 33	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 34	RES-4.02K 1% 100PPM FILM	1075-0094	CAT.LIST	55-100
R 35	RES-36 OHM 5% 1/4W CC	1066-3605	ALLEN BRADLEY	CB3605
R 36	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 37	RES-11K 5% 1/4W CC	1066-1135	ALLEN BRADLEY	CB1135
R 38	POT-500 OHM 10% 1/2W 1T CERMET TRMR	1215-0051	ALLEN BRADLEY	A2A501
R 39	RES-18 OHM 5% 1/4W CC	1066-1805	ALLEN BRADLEY	CB1805
R 40	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 41	RES-18K 5% 1/4W CC	1066-1835	ALLEN BRADLEY	CB1835
R 42	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 43	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 44	RES-160K 5% 1/4W CC	1066-1645	ALLEN BRADLEY	CB1645
R 45	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 46	RES-680 OHM 5% 1/4W CC	1066-6815	ALLEN BRADLEY	CB 6815
R 47	RES-56 OHM 5% 1/4W CC	1066-5605	ALLEN BRADLEY	CB 5605
R 48	RES-36 OHM 5% 1/4W CC	1066-3605	ALLEN BRADLEY	CB3605
R 49	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 50	RES-620 OHM 5% 1/4W CC	1066-6215	ALLEN BRADLEY	CB 6215
R 51	RES-9.1K 5% 1/4W CC	1066-9125	ALLEN BRADLEY	CB 9125
R 52	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 53	RES-13K 5% 1/4W CC	1066-1335	ALLEN BRADLEY	CB1335
R 54	RES-1.1K 5% 1/4W CC	1066-1125	ALLEN BRADLEY	CB1125
R 55	RES-1.6K 5% 1/4W CC	1066-1625	ALLEN BRADLEY	CB1625
R 56	RES-240 OHM 5% 1/4W CC	1066-2415	ALLEN BRADLEY	CB2415
R 57	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 58	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 59	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 60	RES-2.4K 5% 1/4W CC	1066-2425	ALLEN BRADLEY	CB2425
R 61	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 62	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 63	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 65	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 66	RES-200 OHM 1% 100PPM FILM	1075-0082	CAT.LIST	55-100

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 67	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 68	RES-174K 1% 100 PPM FILM	1075-0201	SOURCE APPROVAL LIST	CAT. 55-100
R 69	RES-78.7K 1% 100PPM FILM	1075-0060	CAT.LIST	55-100
R 70	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 71	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 72	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 73	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 74	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 75	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 76	RES-221K 1% 100PPM FILM	1075-0040	CAT.LIST	55-100
R 77	RES-100K 1% 100PPM FILM	1074-0109	CAT.LIST	55-025
R 78	RES-200 OHM 1% 100PPM FILM	1075-0082	CAT.LIST	55-100
R 79	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 80	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 81	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 82	RES-301K 1% 150PPM FILM	1074-1037	CAT.LIST	55-100
R 83	RES-294K 1% 100PPM FILM	1075-0028	CAT.LIST	55-100
R 84	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 85	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 86	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 87	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 88	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 89	RES-62K 5% 1/4W CC	1066-6235	ALLEN BRADLEY	CB 6235
R 90	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 91	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 92	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 93	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 94	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 95	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 96	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB 3325
R 97	RES-4.53K 1% 100PPM FILM	1075-0053	CAT.LIST	55-100
R 98	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 99	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 100	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 101	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 102	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 103	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 104	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 105	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 106	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 107	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 108	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 109	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 110	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 111	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 112	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 113	RES-4.02K 1% 100PPM FILM	1075-0094	CAT.LIST	55-100
R 114	RES-3.57K 1% 100PPM FILM	1075-0056	CAT.LIST	55-100
R 115	POT-1K 10% 1/2W 1T CERMET TRMR	1215-0052	ALLEN BRADLEY	A2A102
R 116	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 117	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 118	RES-15K 1% 100PPM FILM	1075-0081	CAT.LIST	55-100
R 119	POT-5K 10% 1/2W 1T CERMET TRMR	1215-0053	ALLEN BRADLEY	A2A502
R 120	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 121	RES-240K 5% 1/4W CC	1066-2445	ALLEN BRADLEY	CB2445
R 122	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 123	RES-39K 5% 1/4W CC	1066-3935	ALLEN BRADLEY	CB 3935

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 124	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 125	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 126	RES-91 OHM 5% 1/4W CC	1066-9105	ALLEN BRADLEY	CB 9105
R 127	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 128	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 129	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 130	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 131	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 132	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
	INTEGRATED CIRCUIT			
U 1	IC-TL082 8 PIN DIP BIFET OP AMPL	2025-0192	TI	TL082CP
U 2	IC-TL082 8 PIN DIP BIFET OP AMPL	2025-0192	TI	TL082CP
U 3	IC-311 VOLTAGE COMPARATOR	2025-0181	NATIONAL	LM311N
U 4	IC-CA3012	2025-0013	RCA	CA3012
U 5	IC-74121 14 PIN DIP MONOSTABLE MV	2025-0272	T.I	SN74121N
U 6	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 7	IC-4066B 14 PIN DIP QUAD BILATERAL SW	2025-0193	MOTOROLA	MC14066BCP
U 8	IC-4558 8 PIN DIP DUAL OP AMPL	2025-0213		
U 9	IC-4538B 16 PIN DIP MONOSTABLE MV	2025-0194		
U 10	IC-CA3012	2025-0013	RCA	CA3012
	MIXER			
Z 1	MXR-SBL-1 DBL BAL 1-500MHZ	2010-0009	MINI-CIRCUITS LAB	SBL-1

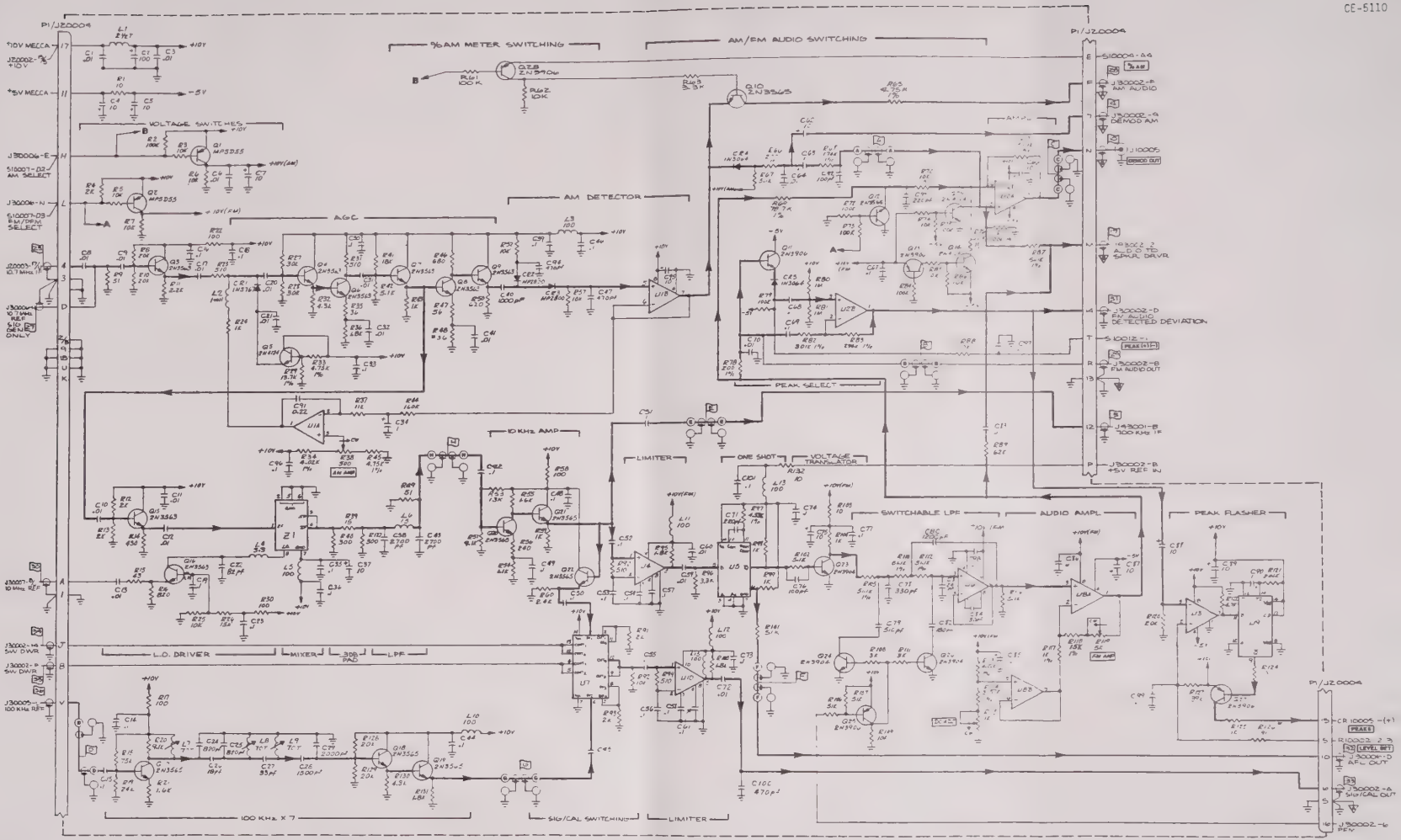


Figure 6-13. 24000 FM/AM Detector No.1.

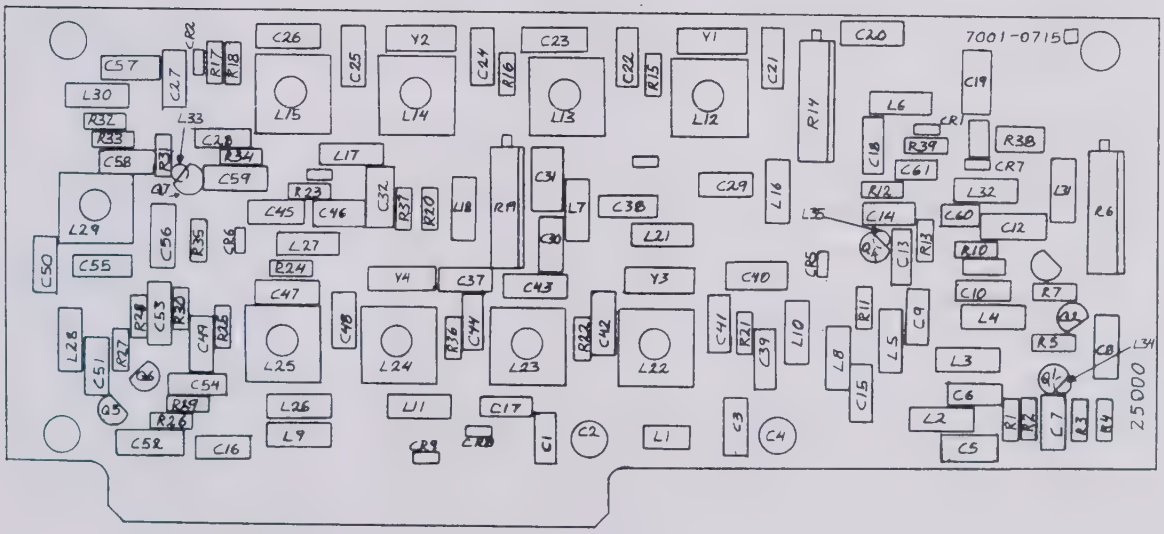
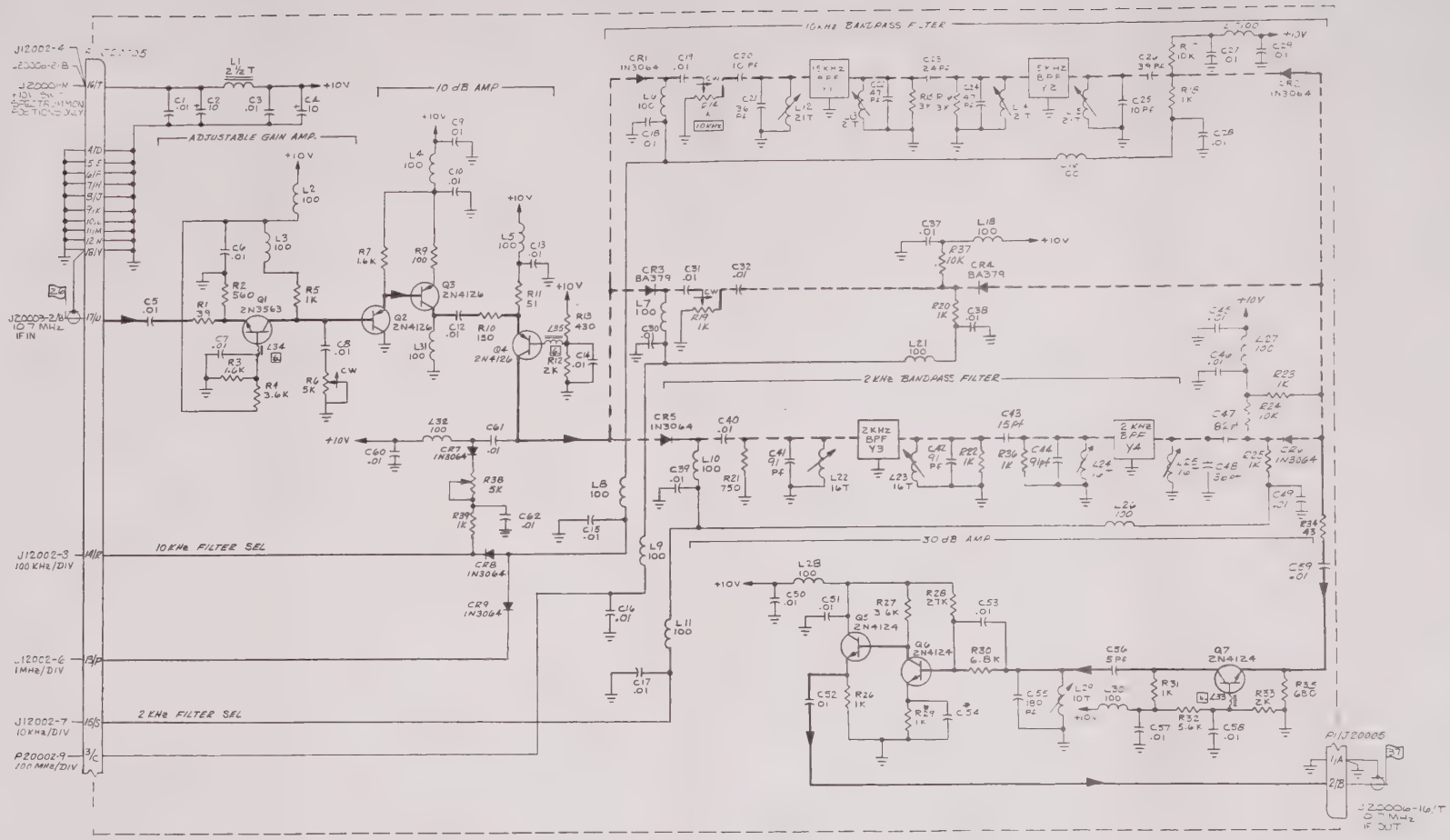


Figure 6-14. 25000 Bandpass Filter, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
25000	PCB ASSY - B.P.F.	7001-0715	CUSHMAN	CE-5110A ONLY
	PRINTED CIRCUIT BOARD	1780-1089	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 2	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 3	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 4	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 5	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 6	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 7	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 8	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 9	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 10	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 12	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 13	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 14	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 15	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 16	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 17	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 18	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 19	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 20	CAP-10PF 5% 500V DIP MICA	1002-0016	ELMENCO	DM15-C-100J
C 21	CAP-36PF 5% 500V DIP MICA	1002-0041	ELMENCO	DM15-E-360J
C 22	CAP-47PF 5% 500V DIP MICA	1002-0012	ELMENCO	DM15-E-470J
C 23	CAP-24PF 5% 500V DIP MICA	1002-0051	ELMENCO	DM15-C-240J
C 24	CAP-47PF 5% 500V DIP MICA	1002-0012	ELMENCO	DM15-E-470J
C 25	CAP-10PF 5% 500V DIP MICA	1002-0016	ELMENCO	DM15-C-100J
C 26	CAP-39PF 5% 500V DIP MICA	1002-0018	ELMENCO	DM15-E-390J
C 27	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 28	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 29	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 30	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 31	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 32	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 37	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 38	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 39	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 40	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 41	CAP-91PF 5% 500V DIP MICA	1002-0027	ELMENCO	DM15-F-910J
C 42	CAP-91PF 5% 500V DIP MICA	1002-0027	ELMENCO	DM15-F-910J
C 43	CAP-15PF 5% 500V DIP MICA	1002-0001	ELMENCO	DM15-C-150J
C 44	CAP-91PF 1% 500V DIP MICA	1002-0048	ELMENCO	DM15-F-910F
C 45	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 46	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 47	CAP-82PF 5% 500V DIP MICA	1002-0020	ELMENCO	DM15-E-820J
C 48	CAP-36PF 5% 500V DIP MICA	1002-0041	ELMENCO	DM15-E-360J
C 49	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 50	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 51	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 52	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 53	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 55	CAP-180PF 5% 500V DIP MICA	1002-0005	ELMENCO	DM15-F-181J
C 56	CAP-5PF .5PF 500V DIP MICA	1002-0028	ELMENCO	DM15-C-050D
C 57	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 58	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C 59	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 60	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 61	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 62	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 4	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	INDUCTOR			
L 1	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 2	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 3	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 4	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 5	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 6	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 7	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 8	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 9	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 10	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 11	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 12	COIL 3.9 MHZ	1596-0104		
L 13	COIL 3.9 MHZ	1596-0104		
L 14	COIL 3.9 MHZ	1596-0104		
L 15	COIL 3.9 MHZ	1596-0104		
L 16	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 17	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 18	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 21	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 22	COIL ASSY-VARIABLE	7050-0128	CUSHMAN	IN HOUSE
L 23	COIL ASSY-VARIABLE	7050-0128	CUSHMAN	IN HOUSE
L 24	COIL ASSY-VARIABLE	7050-0128	CUSHMAN	IN HOUSE
L 25	COIL ASSY-VARIABLE	7050-0128	CUSHMAN	IN HOUSE
L 26	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 27	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 28	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 29	COIL-VARIABLE IF	7050-0131		
L 30	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 31	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 32	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 33	CH-.047X.138X.118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
L 34	CH-.047X.138X.118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
L 35	CH-.047X.138X.118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
	TRANSISTOR			
Q 1	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 2	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 3	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 4	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 5	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
Q 6	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 7	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
	RESISTOR			
R 1	RES-39 OHM 5% 1/4W CC	1066-3905	ALLEN BRADLEY	CB 3905
R 2	RES-560 OHM 5% 1/4W CC	1066-5615	ALLEN BRADLEY	CB 5615
R 3	RES-1.6K 5% 1/4W CC	1066-1625	ALLEN BRADLEY	CB1625
R 4	RES-3.6K 5% 1/4W CC	1066-3625	ALLEN BRADLEY	CB3625
R 5	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 6	POT-5K 10% 3/4W 15T CERMET TRMR	1215-0012	HELITRIM	89WR5K
R 7	RES-1.6K 5% 1/4W CC	1066-1625	ALLEN BRADLEY	CB1625
R 9	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 10	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 11	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 12	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 13	RES-430 OHM 5% 1/4W CC	1066-4315	ALLEN BRADLEY	CB 4315
R 14	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 15	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 16	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 17	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 18	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 19	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 20	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 21	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 22	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 23	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 24	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 25	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 26	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 27	RES-3.6K 5% 1/4W CC	1066-3625	ALLEN BRADLEY	CB3625
R 28	RES-27K 5% 1/4W CC	1066-2735	ALLEN BRADLEY	CB2735
R 29	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 30	RES-6.8K 5% 1/4W CC	1066-6825	ALLEN BRADLEY	CB 6825
R 31	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 32	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 33	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 34	RES-43 OHM 5% 1/4W CC	1066-4305	ALLEN BRADLEY	CB 4305
R 35	RES-680 OHM 5% 1/4W CC	1066-6815	ALLEN BRADLEY	CB 6815
R 36	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 37	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 38	POT-5K 20% 1/2W 1T CERMET TRMR	1203-0071	BECKMAN	91AR5K
R 39	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
	CRYSTAL			
Y 1	FLTR-XTAL 10.7MHZ 3DB BW 15KHZ	1040-0040	PIEZO	C/E DWG(2194F)
Y 2	FLTR-XTAL 10.7MHZ 3DB BW 15KHZ	1040-0039	CTS KNIGHTS	C/E DWG
Y 3	FLTR-XTAL 10.7MHZ 3DB BW 2KHZ	1040-0038	CTS KNIGHTS	C/E DWG
Y 4	FLTR-XTAL 10.7MHZ 3DB BW 2KHZ	1040-0038	CTS KNIGHTS	C/E DWG



NOTE

1. FERRITE BEAD.
2. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
3. *FACTORY SELECT. TYPICAL VALUE SHOWN.
4. INDUCTORS - VALUES IN uH UNLESS OTHERWISE NOTED.
5. CAPACITORS - VALUES IN uF UNLESS OTHERWISE NOTED.
6. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-15. 25000 Bandpass Filter.

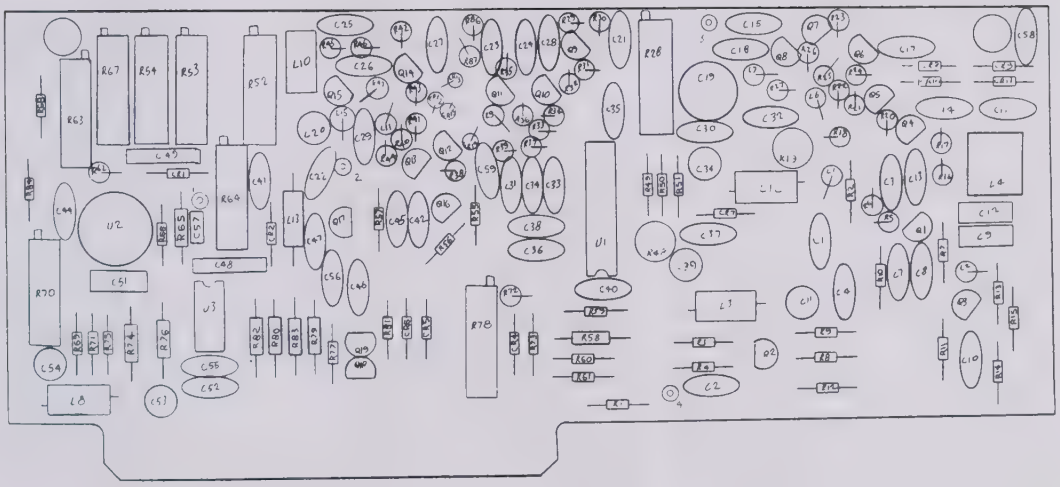


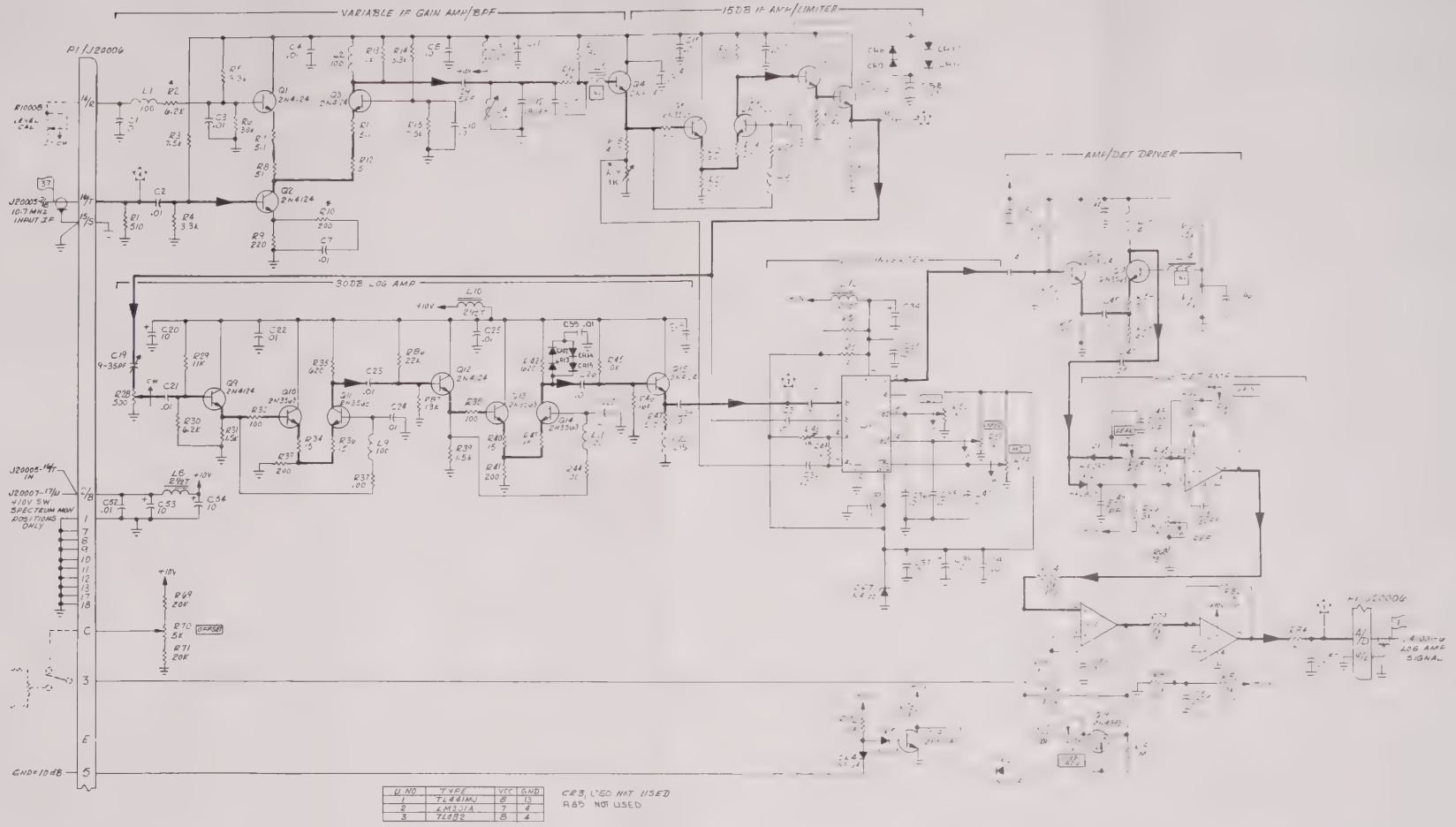
Figure 6-16 26000 Log Converter, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
26000	PCB ASSY - LOG CONVERTER	7001-0716	CUSHMAN	CE-5110A ONLY
	PRINTED CIRCUIT BOARD	1780-0994	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 2	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 3	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 4	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 7	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 8	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 9	CAP-5PF .5PF 500V DIP MICA	1002-0028	ELMENCO	DM15-C-050D
C 10	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 11	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 12	CAP-180PF 5% 500V DIP MICA	1002-0005	ELMENCO	DM15-F-181J
C 13	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 14	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 15	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 16	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 17	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 18	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 19	CAP-9-35PF 200V N650 V MT CER TRMR	1001-0006	ERIE	CV31D350
C 20	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 21	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 22	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 23	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 24	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 25	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 26	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 27	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 28	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 29	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 30	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 31	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 32	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 33	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 34	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 35	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 36	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 37	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 38	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 39	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 40	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 41	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 42	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 43	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 44	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 45	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 46	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 47	CAP-.05UF +80-20% 25V Y5U CER DISC	1005-0014	TUSONIX	5835-514-Y5U-503Z
C 48	CAP-2000PF 5% 500V DIP MICA	1002-0077	ELMENCO	DM-19-E-202J
C 49	CAP-2000PF 5% 500V DIP MICA	1002-0077	ELMENCO	DM-19-E-202J
C 51	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 52	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 53	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 54	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 55	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
56	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C 57	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 58	CAP-.01UF+80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 59	CAP-.01UF+80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
	DIODE			
CR 1	DIO-HP2800 SI HOT CARR A1N 2PF 70PRV	1283-0001	HP	5082-2800
CR 2	DIO-HP2800 SI HOT CARR A1N 2PF 70PRV	1283-0001	HP	5082-2800
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N4733 SI ZENER A98A 5.1V 10% 1W	1281-0015	MOTOROLA	1N4733
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 10	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 11	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 12	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 13	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 14	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 15	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	INDUCTOR			
L 1	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 2	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 3	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 4	COIL-VARIABLE IF	7050-0131		
L 5	CH-.047X.138X.118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
L 6	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 7	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 8	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 9	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 10	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 11	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 12	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 13	CH-47UH 5% RF MLD AXL .16DX.38L	1585-0010	DELEVAN	1537-60
L 14	CH-.047X.138X.118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
L 15	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
	TRANSISTOR			
Q 1	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 2	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 3	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 4	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 5	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 6	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 7	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 8	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 9	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 10	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 11	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 12	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 13	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 14	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 15	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 16	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 17	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 18	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 19	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	RESISTOR			
R 1	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 2	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 3	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 4	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 5	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 6	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 7	RES-5.1 OHM 5% 1/4W CC	1066-0002	ALLEN BRADLEY	CB51G5
R 8	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 9	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 10	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 11	RES-5.1 OHM 5% 1/4W CC	1066-0002	ALLEN BRADLEY	CB51G5
R 12	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 13	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 14	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 15	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 16	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 17	RES-18K 5% 1/4W CC	1066-1835	ALLEN BRADLEY	CB1835
R 18	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 19	POT-500 OHM 10% 1/2W 1T CERMET TRMR	1215-0051	ALLEN BRADLEY	A2A501
R 20	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 21	RES-39 OHM 5% 1/4W CC	1066-3905	ALLEN BRADLEY	CB 3905
R 22	RES-270 OHM 5% 1/4W CC	1066-2715	ALLEN BRADLEY	CB2715
R 23	RES-560 OHM 5% 1/4W CC	1066-5615	ALLEN BRADLEY	CB 5615
R 24	RES-39 OHM 5% 1/4W CC	1066-3905	ALLEN BRADLEY	CB 3905
R 25	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 26	RES-2.4K 5% 1/4W CC	1066-2425	ALLEN BRADLEY	CB2425
R 27	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 28	POT-500 OHM 10% 3/4W 15T CERMET TRMR	1215-0011	HELITRIM	89WR
R 29	RES-11K 5% 1/4W CC	1066-1135	ALLEN BRADLEY	CB1135
R 30	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 31	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 32	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 33	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 34	RES-15 OHM 5% 1/4W CC	1066-1505	ALLEN BRADLEY	CB1505
R 35	RES-620 OHM 5% 1/4W CC	1066-6215	ALLEN BRADLEY	CB 6215
R 36	RES-15 OHM 5% 1/4W CC	1066-1505	ALLEN BRADLEY	CB1505
R 37	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 38	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 39	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 40	RES-15 OHM 5% 1/4W CC	1066-1505	ALLEN BRADLEY	CB1505
R 41	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 42	RES-620 OHM 5% 1/4W CC	1066-6215	ALLEN BRADLEY	CB 6215
R 43	RES-15 OHM 5% 1/4W CC	1066-1505	ALLEN BRADLEY	CB1505
R 44	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 45	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 46	RES-16K 5% 1/4W CC	1066-1635	ALLEN BRADLEY	CB1635
R 47	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 48	POT-100 OHM 10% 1/2 1T CERMET TRMR	1215-0056	ALLEN BRADLEY	A2A101
R 49	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 50	RES-160 OHM 5% 1/4W CC	1066-1615	ALLEN BRADLEY	CB1615
R 51	RES-160 OHM 5% 1/4W CC	1066-1615	ALLEN BRADLEY	CB1615
R 52	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 53	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 54	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 55	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 56	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 57	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 58	RES-301 OHM 1% 100PPM FILM	1075-0048	CAT. LIST	55-100
R 59	RES-430 OHM 5% 1/4W CC	1066-4315	ALLEN BRADLEY	CB 4315
R 60	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 61	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 62	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 63	POT-10K 10% 3/4W 15T CERMET TRMR	1215-0014	HELITRIM	89WR10K
R 64	POT-500 OHM 10% 3/4W 15T CERMET TRMR	1215-0011	HELITRIM	89WR
R 65	RES-1.21K 1% 100PPM FILM	1075-0042	CAT.LIST	55-100
R 66	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 67	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 68	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 69	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 70	POT-5K 10% 3/4W 15T CERMET TRMR	1215-0012	HELITRIM	89WR5K
R 71	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 72	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 73	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 74	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 75	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 76	RES-100K 1% 100PPM FILM	1074-0109	CAT.LIST	55-025
R 77	RES 10K 1% 1/4W 100PPM FILM	1075-0009	CAT. LIST	55-100
R 78	POT-2K 10% 3/4W 15T CERMET TRMR	1215-0015	BECKMAN	89WR2K
R 79	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 80	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 81	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H ONLY
R 82	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 83	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 84	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 86	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 87	RES-13K 5% 1/4W CC	1066-1335	ALLEN BRADLEY	CB1335
	INTEGRATED CIRCUIT			
U 1	IC-TL441MJ LOGARITHMIC AMP	2025-0049	TI	SN56502N
U 2	IC-LM301A OP AMP	2025-0032	NATIONAL	LM301AH
U 3	IC-TL082 8 PIN DIP BIFET OP AMPL	2025-0192	TI	TL082CP



U NO	TYPE	VCC	GND
1	TL441MJ	8	13
2	LM301A	7	4
3	TL082	8	4

CR3, C50 NOT USED
R85 NOT USED

NOTE:
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
FERRITE BEADS.

Figure 6-17. 26000 Log Converter.

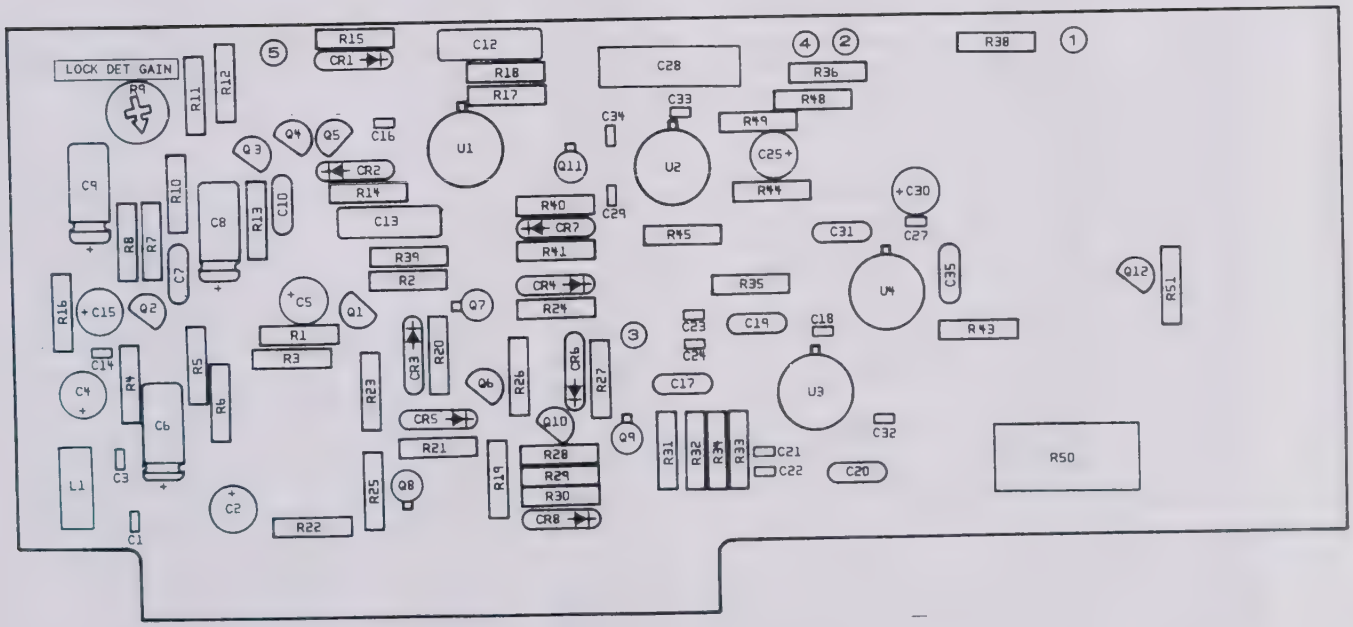
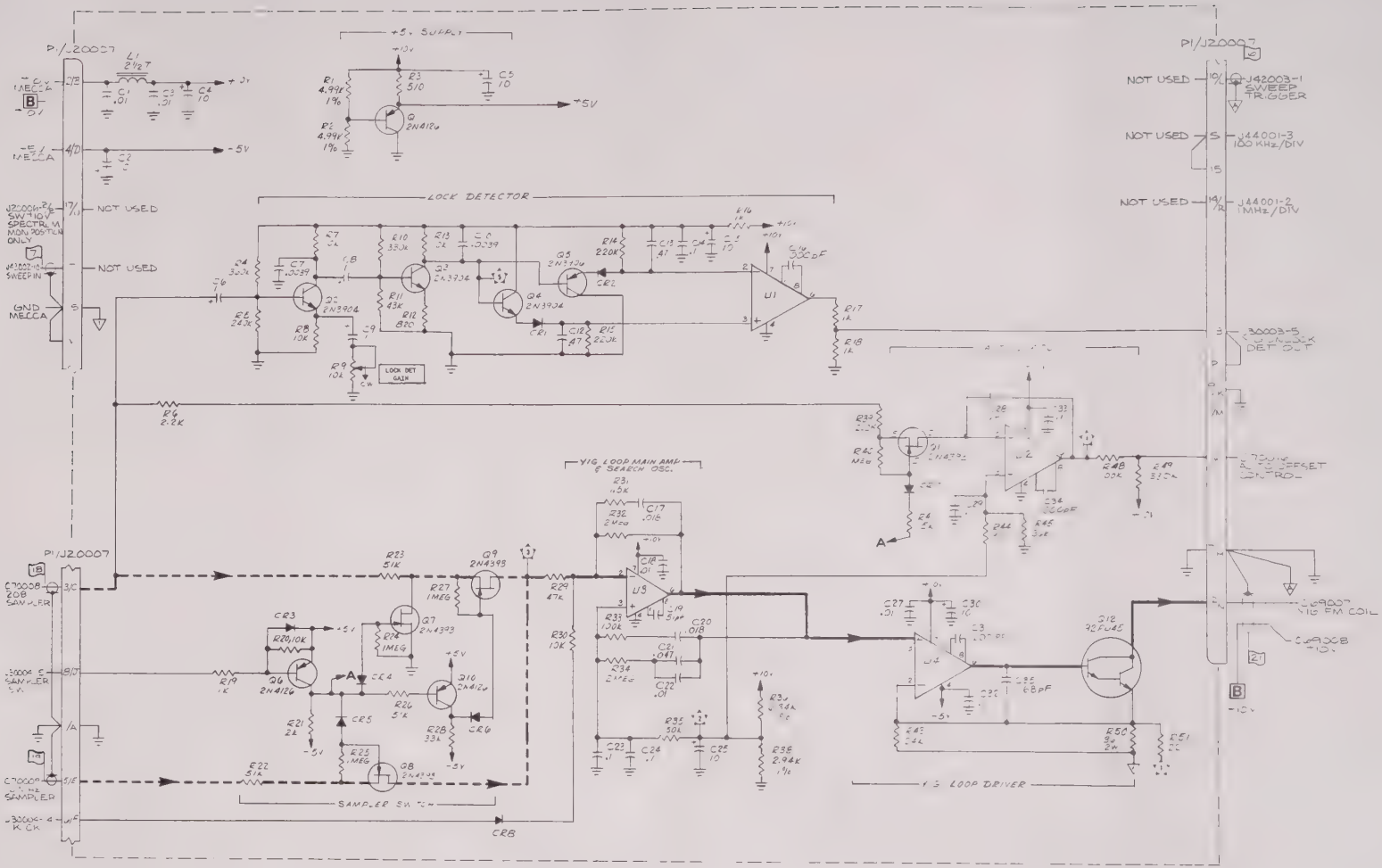


Figure 6-18. 27000 YIG FM Coil Driver/Sweep Driver, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
27000	PCB ASSY - YIG FM COIL DRIVER	7001-0490	CUSHMAN	CE-45A & CE-50A ONLY
	PRINTED CIRCUIT BOARD	1780-1058	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 5	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 6	CAP-1UF+75-10% 50V ELCTLT	1013-0004	SPRAGUE	30D105G050BA5
C 7	CAP-.0039UF GMV 1KV Z5U CER DISC	1005-0106	SPRAGUE	5HK-D39
C 8	CAP-1UF+75-10% 50V ELCTLT	1013-0004	SPRAGUE	30D105G050BA5
C 9	CAP-1UF+75-10% 50V ELCTLT	1013-0004	SPRAGUE	30D105G050BA5
C 10	CAP-.0039UF GMV 1KV Z5U CER DISC	1005-0106	SPRAGUE	5HK-D39
C 12	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 13	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 14	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 15	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 16	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 17	CAP-.018UF 10% 100V RDL POLYESTER	1008-0008	SPRAGUE	225P18391WD3
C 18	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 19	CAP-51PF 5% 500V DIP MICA	1002-0045	ELMENCO	DM15-E-510J
C 20	CAP-.018UF 10% 100V RDL POLYESTER	1008-0008	SPRAGUE	225P18391WD3
C 21	CAP-.047UF 20% 100V V5W MINTR CER	1005-0096	ERIE	8121-100-651-473M
C 22	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 23	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 24	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 25	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP	10PC25
C 27	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 28	CAP-.68UF 10% 100V AXL POLYCARBONATE	1008-0039	ELECTROCUBE	625B1B684K
C 29	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 30	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 31	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 32	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 33	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 34	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 35	CAP-68PF 5% 500V DIP MICA	1002-0013	ELMENCO	DM15-E-680J
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	TRANSISTOR			
Q 1	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 2	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 3	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 4	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 5	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 6	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 7	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 8	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
Q 9	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 10	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 11	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 12	XSTR-92PU45 NPN SI DARLINGTON	1272-0113	NATIONAL	92PU45
	RESISTOR			
R 1	RES-4.99K 1% 100PPM FILM	1075-0095	CAT.LIST	55-100
R 2	RES-4.99K 1% 100PPM FILM	1075-0095	CAT.LIST	55-100
R 3	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 4	RES-360K 5% 1/4W CC	1066-3645	ALLEN BRADLEY	CB3645
R 5	RES-240K 5% 1/4W CC	1066-2445	ALLEN BRADLEY	CB2445
R 6	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 7	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 8	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 9	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 10	RES-330K 5% 1/4 CC	1066-3345	ALLEN BRADLEY	CB3345
R 11	RES-43K 5% 1/4W CC	1066-4335	ALLEN BRADLEY	CB 4335
R 12	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215
R 13	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 14	RES-220K 5% 1/4W CC	1066-2245	ALLEN BRADLEY	CB2245
R 15	RES-220K 5% 1/4W CC	1066-2245	ALLEN BRADLEY	CB2245
R 16	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 17	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 18	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 19	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 20	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 21	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 22	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 23	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 24	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 25	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 26	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 27	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 28	RES-33K 5% 1/4W CC	1066-3335	ALLEN BRADLEY	CB3335
R 29	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 30	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 31	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 32	RES-2MEG 5% 1/4W CC	1066-2055	ALLEN BRADLEY	CB2055
R 33	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 34	RES-2MEG 5% 1/4W CC	1066-2055	ALLEN BRADLEY	CB2055
R 35	RES-150K 5% 1/4W CC	1066-1545	ALLEN BRADLEY	CB1545
R 36	RES-6.34K 1% 150PPM FILM	1074-1007	CAT.LIST	55-100
R 38	RES-2.94K 1% 100PPM FILM	1075-0108	CAT.LIST	55-100
R 39	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 40	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 41	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 43	RES-24K 5% 1/4W CC	1066-2435	ALLEN BRADLEY	CB2435
R 44	RES-910 OHM 5% 1/4W CC	1066-9115	ALLEN BRADLEY	CB 9115
R 45	RES-36K 5% 1/4W CC	1066-3635	ALLEN BRADLEY	CB3635
R 48	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 49	RES-330K 5% 1/4 CC	1066-3345	ALLEN BRADLEY	CB3345
R 50	RES-36 OHM-5% 2W CC	1069-3605	ALLEN BRADLEY	HB 3605
R 51	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	INTEGRATED CIRCUIT			
U 1	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 2	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 3	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 4	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T



U NO	TYPE	VCC	GND
1, 2, 3	CA3130	7	4
4	0P02B	7	4

C11, C26 & R37, 42, 46, 47 NOT USED.

NOTE:
1. ALL DIODES ARE 1N3064 UNLESS OTHERWISE NOTED.
2. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
3. *FACTORY SELECT. TYPICAL VALUE SHOWN.
4. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
5. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
6. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-19. 27000 YIG FM Coil Driver/Sweep Driver.

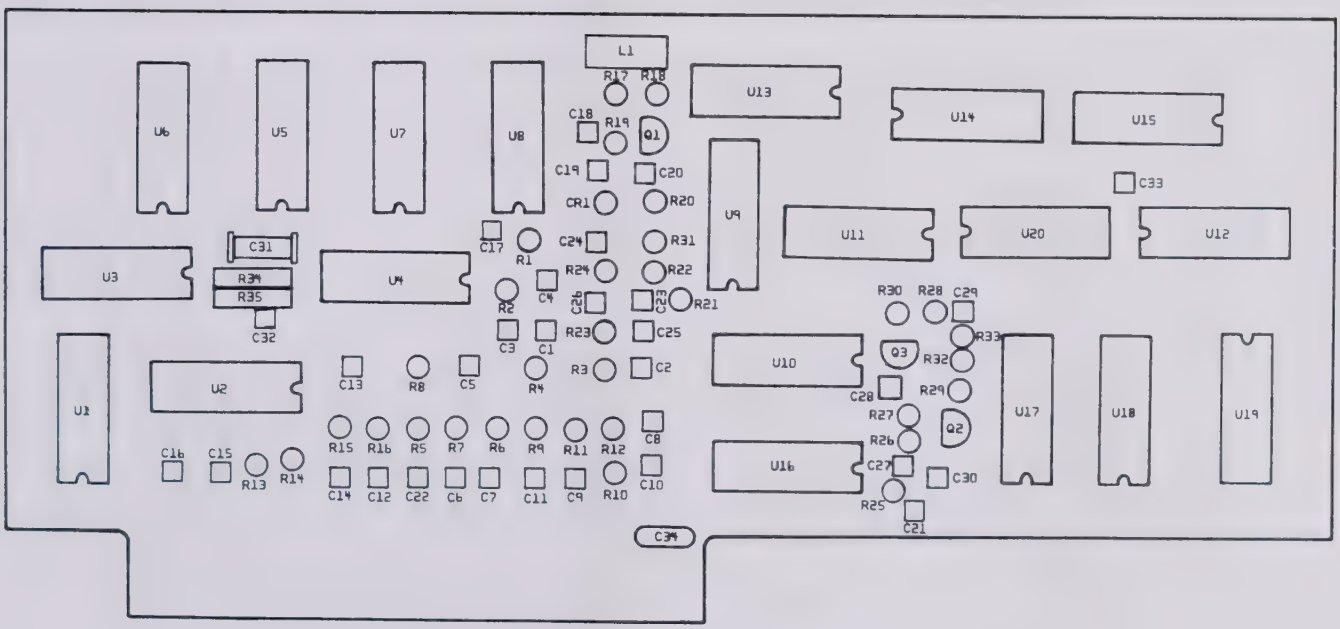


Figure 6-20. 28000 Loops A and B Divide-By-N, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
28000	PCB ASSY - LOOPS A & B DIV-BY-N	7001-0492	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1008	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 15	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 16	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 19	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 20	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 21	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 22	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 23	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 24	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 25	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 26	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 27	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 28	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 29	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 30	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 31	CAP-6.8PF .25PF 500V NPO CER TUB	1005-0006	TUSONIX	301-000-C0H0-689C
C 32	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 33	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 34	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	INDUCTOR			
L 1	CH-220UH 5% RF MLD AXL .16DX.38L	1585-0018	DELEVAN	1537-92
	TRANSISTOR			
Q 1	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 2	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 3	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
	RESISTOR			
R 1	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 2	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 3	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 4	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 5	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 6	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 7	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 8	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 9	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 10	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 11	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 12	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 13	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 14	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 15	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 16	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 17	RES-43 OHM 5% 1/4W CC	1066-4305	ALLEN BRADLEY	CB 4305
R 18	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 19	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 20	RES-1.3K 5% 1/4W CC	1066-1325	ALLEN BRADLEY	CB1325
R 21	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 22	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 23	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 24	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 25	RES-62 OHM 5% 1/4W CC	1066-6205	ALLEN BRADLEY	CB 6205
R 26	RES-1.3K 5% 1/4W CC	1066-1325	ALLEN BRADLEY	CB1325
R 27	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 28	RES-620 OHM 5% 1/4W CC	1066-6215	ALLEN BRADLEY	CB 6215
R 29	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 30	RES-1.3K 5% 1/4W CC	1066-1325	ALLEN BRADLEY	CB1325
R 31	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 32	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 33	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 34	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 35	RES-33K 5% 1/4W CC	1066-3335	ALLEN BRADLEY	CB3335
	INTEGRATED CIRCUIT			
U 1	IC-SN74LS196N DECADE COUNTERS	2025-0111	TI	SN74LS196N
U 2	IC-SN74LS196N DECADE COUNTERS	2025-0111	TI	SN74LS196N
U 3	IC-SN74LS196N DECADE COUNTERS	2025-0111	TI	SN74LS196N
U 4	IC-SN74LS196N DECADE COUNTERS	2025-0111	TI	SN74LS196N
U 5	IC-9602 16 PIN DIP MONOSTABLE MV	2025-0191	NATIONAL	DM9602N
U 6	IC-SN74LS73N DUAL J-K FLIP FLOP	2025-0110	TI	SN74LS73N
U 7	IC-SN7430A NAND GATES	2025-0004	TI	SN7430N
U 8	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 9	IC-SN74LS04N HEX INVERTOR	2025-0084	TI	SN74LS04N
U 10	IC-74LS10 14 PIN DIP TRIPLE 3-INP NAND	2025-0215	NATIONAL	DM74LS10N
U 11	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 12	IC-74S02 14 PIN DIP QUAP 2-INP NOR GAT	2025-0190		
U 13	IC-SN74196N	2025-0016	FAIRCHILD	74196PC
U 14	IC-SN74196N	2025-0016	FAIRCHILD	74196PC
U 15	IC-SN74196N	2025-0016	FAIRCHILD	74196PC
U 16	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 17	IC-SN74S112N DUAL J-K FLIP-FLOP	2025-0086	TI	SN74S112N
U 18	IC-SN74S112N DUAL J-K FLIP-FLOP	2025-0086	TI	SN74S112N
U 19	IC-SN74S112N DUAL J-K FLIP-FLOP	2025-0086	TI	SN74S112N
U 20	IC-SN7420N DUAL 4 INPUT NAND GATE	2025-0008	TI	SN7420N

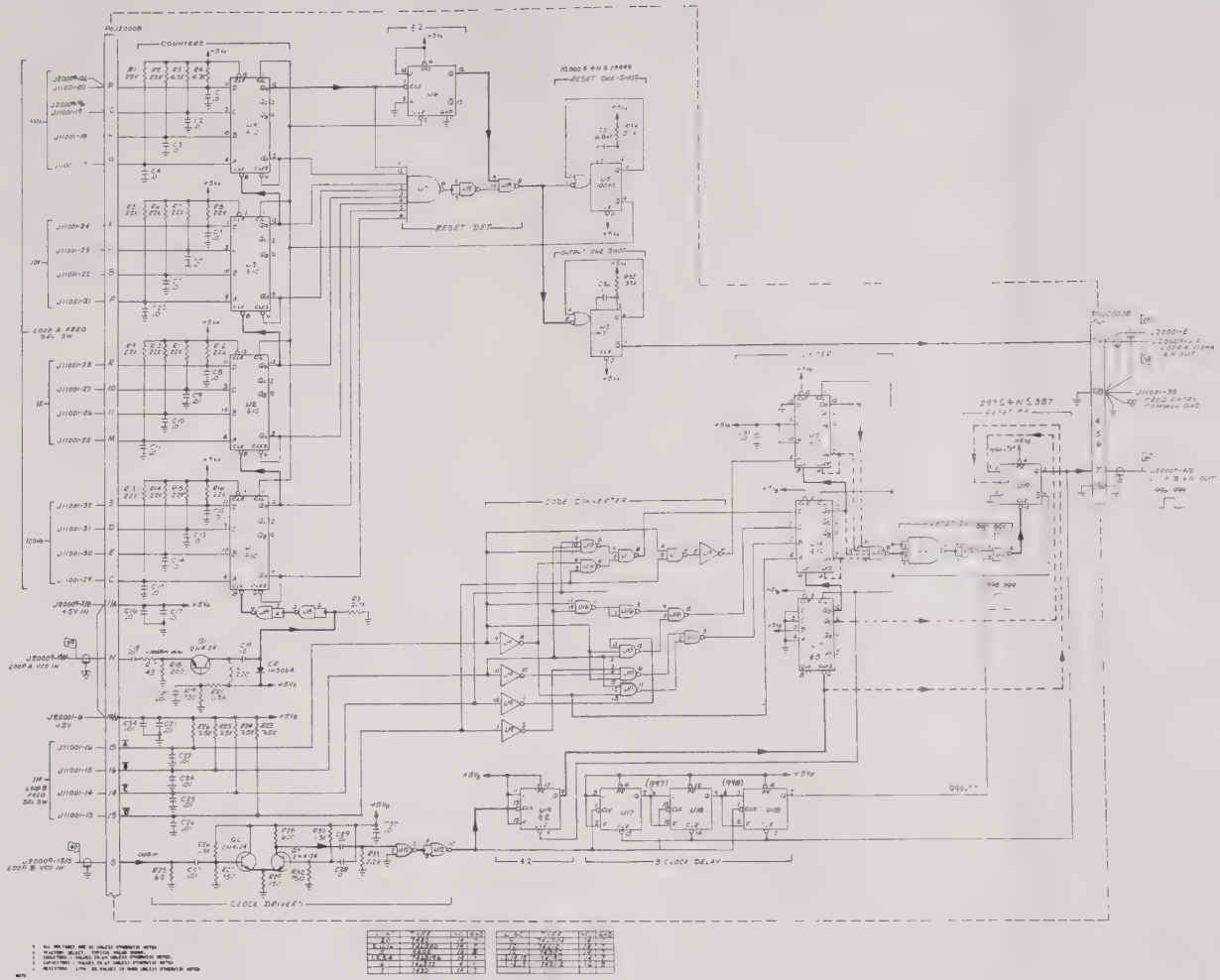


Figure 6-21. 28000 Loops A and B Divide-By-N.

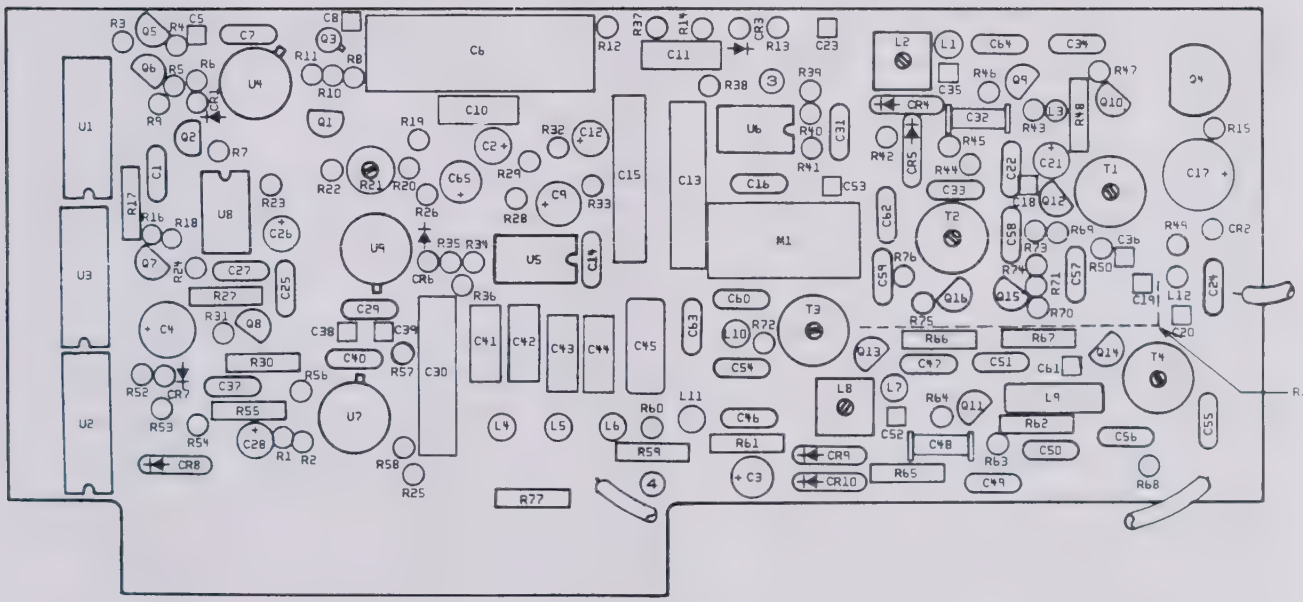


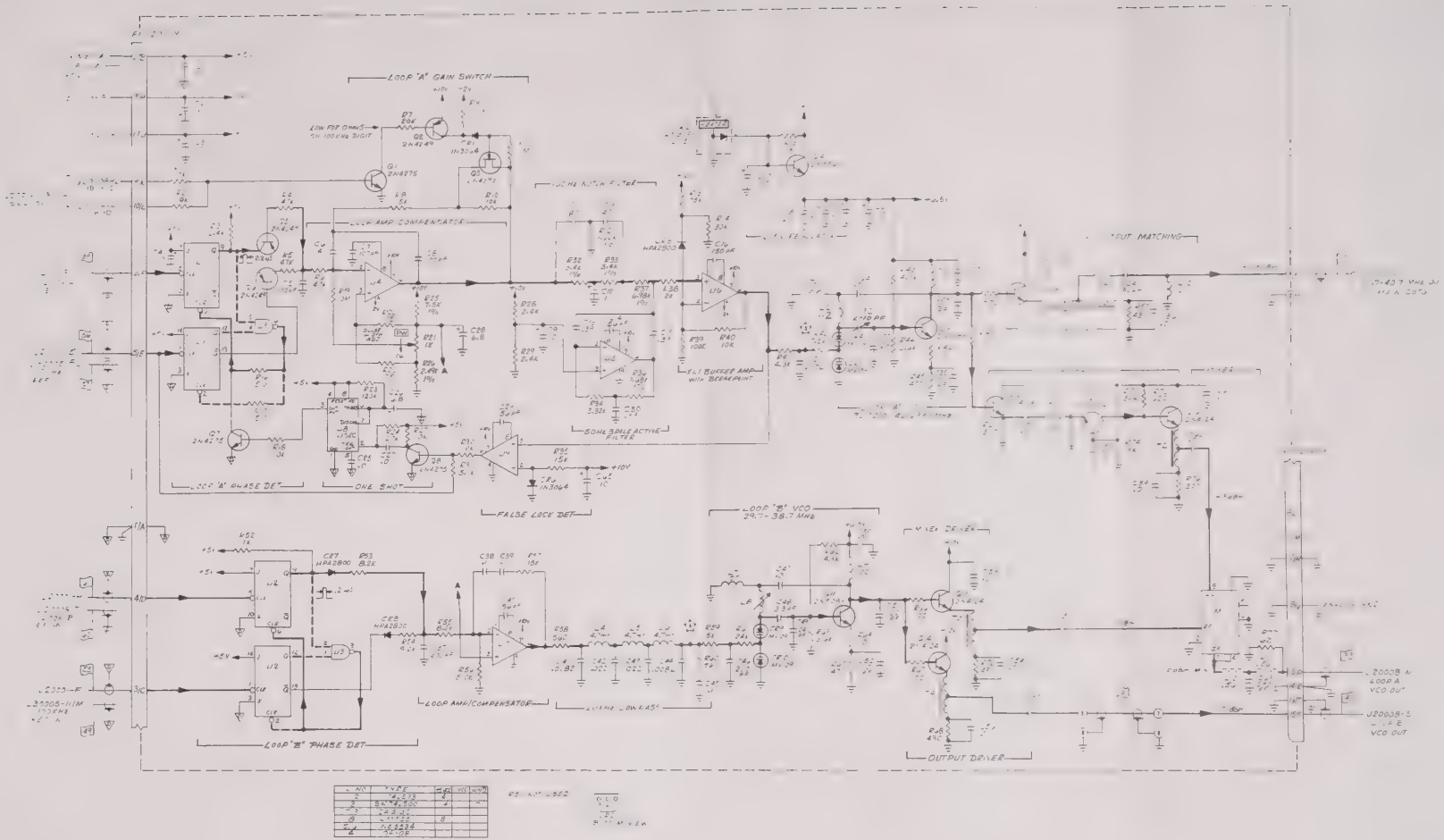
Figure 6-22. 29000 Loops A and B VCO Phase Detector, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
29000	PCB ASSY - LOOPS A & B VCO/PHASE DET	7001-0493	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1028	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 2	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 3	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 4	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 5	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 6	CAP-4UF 10% 50V RDL MET-POLYESTER	1008-0102	ELPAC	Z5R405K
C 7	CAP-100PF 5% 500V DIP MICA	1002-0011	ELMENCO	DM15-F-101J
C 8	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 9	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 10	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 11	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 12	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 13	CAP-.39UF 10% 200V RDL POLYCARBONATE	1008-0037	ELECTROCUBE	625B1C394K2
C 14	CAP-56PF 5% 500V DIP MICA	1002-0019	ELMENCO	DM15-E-560J
C 15	CAP-.39UF 10% 200V RDL POLYCARBONATE	1008-0037	ELECTROCUBE	625B1C394K2
C 16	CAP-150PF 5% 500V DIP MICA	1002-0021	ARCO	ADM15FD151J
C 17	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 18	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 19	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 20	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 21	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 22	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 23	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 24	CAP-82PF 5% 500V DIP MICA	1002-0020	ELMENCO	DM15-E-820J
C 25	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 26	CAP-6.8UF 10% 35V RDL TANT	1011-0002	DICKSON	D6R8GS1B35K
C 27	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 28	CAP-6.8UF 10% 35V RDL TANT	1011-0002	DICKSON	D6R8GS1B35K
C 29	CAP-56PF 5% 500V DIP MICA	1002-0019	ELMENCO	DM15-E-560J
C 30	CAP-.39UF 10% 200V RDL POLYCARBONATE	1008-0037	ELECTROCUBE	625B1C394K2
C 31	CAP-.002UF 20% 500V Z5U CER DISC	1005-0003	TUSONIX	831-596-Z5U-202M
C 32	CAP-2-10PF 25V NPO V ADJ CER TRMR	1001-0024	TUSONIX	513-011 A 2-10PF
C 33	CAP-10PF 5% 500V DIP MICA	1002-0016	ELMENCO	DM15-C-100J
C 34	CAP-120PF 5% 500V DIP MICA	1002-0010	ELMENCO	DM15-F-121J
C 35	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 36	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 37	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 38	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 39	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 40	CAP-56PF 5% 500V DIP MICA	1002-0019	ELMENCO	DM15-E-560J
C 41	CAP-.0082UF 5% 600V RDL POLYESTER	1008-0095	PLESSEY CAP.	60C822V630
C 42	CAP-.022UF 5% 400V RDL POLYESTER	1008-0094	PLESSEY CAP.	60C223J400
C 43	CAP-.022UF 5% 400V RDL POLYESTER	1008-0094	PLESSEY CAP.	60C223J400
C 44	CAP-.0082UF 5% 600V RDL POLYESTER	1008-0095	PLESSEY CAP.	60C822V630
C 45	CAP-.1UF 10% 100V RDL POLYESTER	1008-0031	SPRAGUE	225P10491 WA3
C 46	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 47	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 48	CAP-3.3PF .25PF 500V NPO CER TUB	1005-0011	TUSONIX	301-00-C0J0-339C
C 49	CAP-10PF 5% 500V DIP MICA	1002-0016	ELMENCO	DM15-C-100J
C 50	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 51	CAP-120PF 5% 500V DIP MICA	1002-0010	ELMENCO	DM15-F-121J
C 52	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 53	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C 54	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 55	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 56	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 57	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 58	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 59	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 60	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 61	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 62	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 63	CAP-250PF 5% 500V DIP MICA	1002-0061	ELMENCO	DM15-F-251J
C 64	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 65	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-3999 ZENER TO92 6.95V 5PPM	1281-0136	NATIONAL	LM3999Z
CR 3	DIO-HP2800 SI HOT CARR AIN 2PF 70PRV	1283-0001	HP	5082-2800
CR 4	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
CR 5	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-HP2800 SI HOT CARR AIN 2PF 70PRV	1283-0001	HP	5082-2800
CR 8	DIO-HP2800 SI HOT CARR AIN 2PF 70PRV	1283-0001	HP	5082-2800
CR 9	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
CR 10	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
	INDUCTOR			
L 1	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 2	CH-1.2UH 10% RF MLD AXL .16DX.38L	1585-0066	DELEVAN	1537-14
L 3	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 4	CH-4.7UH 10% RF MLD SHLD AXL .16DX.40L	1585-0055	DELEVAN	1641-472
L 5	CH-4.7UH 10% RF MLD SHLD AXL .16DX.40L	1585-0055	DELEVAN	1641-472
L 6	CH-4.7UH 10% RF MLD SHLD AXL .16DX 40L	1585-0055	DELEVAN	1641-472
L 7	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 8	COIL-VAR IF L31-6/10/44 LITZ/14T	1596-0291		
L 9	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 10	CH-.56UH 10% RF MLD AXL .19DX.44L	1585-0036	DELEVAN	1840-07
L 11	CH-.56UH 10% RF MLD AXL .19DX.44L	1585-0036	DELEVAN	1840-07
L 12	CH-.1UH 10% RF MLD SHLD AXL .16DX.40L	1585-0041	DELEVAN	1641-101
	TRANSISTOR			
Q 1	XSTR-2N4275 NPN SI R110 LOW PWR/SW	1272-0016	FAIRCHILD	2N4275
Q 2	XSTR-2N4249 PNP SI R124B LOW PWR	1272-0024	CARTER SEMI	2N4249
Q 3	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 4	XSTR-2N3567 NPN SI TO 105 LOW PWR	1272-0014		
Q 5	XSTR-2N4249 PNP SI R124B LOW PWR	1272-0024	CARTER SEMI	2N4249
Q 6	XSTR-2N4249 PNP SI R124B LOW PWR	1272-0024	CARTER SEMI	2N4249
Q 7	XSTR-2N4275 NPN SI R110 LOW PWR/SW	1272-0016	FAIRCHILD	2N4275
Q 8	XSTR-2N4275 NPN SI R110 LOW PWR/SW	1272-0016	FAIRCHILD	2N4275
Q 9	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 10	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 11	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 12	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 13	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 14	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 15	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 16	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	RESISTOR			
R 1	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 2	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 3	RES-2.4K 5% 1/4W CC	1066-2425	ALLEN BRADLEY	CB2425
R 4	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 5	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 6	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 7	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 8	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 9	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 10	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 11	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 12	RES-1.62K 1% 100PPM FILM	1075-0104	CAT.LIST	55-100
R 13	RES-75K 1% 100PPM FILM	1075-0135	CAT. LIST	55-100
R 14	RES-29.4K 1% 100PPM FILM	1074-0092	CAT.LIST	55-050
R 15	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 16	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 17	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 18	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 19	RES-10MEG 5% 1/4W CC	1066-1065	ALLEN BRADLEY	AB1065
R 20	RES-75 OHM 5% 1/4W CC	1066-7505	ALLEN BRADLEY	CB 7505
R 21	POT-1K 20% 1/2W 4T CERMET TRMR	1203-0058	BOURNS	3339H-1-102
R 22	RES-75 OHM 5% 1/4W CC	1066-7505	ALLEN BRADLEY	CB 7505
R 23	RES-120K 5% 1/4W CC	1066-1245	ALLEN BRADLEY	CB1245
R 24	RES-27K 5% 1/4W CC	1066-2735	ALLEN BRADLEY	CB2735
R 25	RES-7.5K 1% 100PPM FILM	1075-0158	CAT. LIST	55-100
R 26	RES-2.49K 1% 100PPM FILM	1075-0027	CAT.LIST	55-100
R 27	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 28	RES-2.43K 1% 100PPM FILM	1075-0019	CAT.LIST	55-100
R 29	RES-2.43K 1% 100PPM FILM	1075-0019	CAT.LIST	55-100
R 30	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 31	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 32	RES-3.4K 1% 100PPM FILM	1075-0020	CAT.LIST	55-100
R 33	RES-3.4K 1% 100PPM FILM	1075-0020	CAT.LIST	55-100
R 34	RES-3.32K 1% 100PPM FILM	1075-0181	SHELLY RODABAUGH	RN55D
R 35	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 36	RES-7.68K 1% 100PPM FILM	1075-0054	CAT.LIST	55-100
R 37	RES-6.98K 1% 150PPM FILM	1074-1028	CAT.LIST	55-025
R 38	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 39	RES-6.19K 1% 100PPM FILM	1075-0109	CAT.LIST	55-100
R 40	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 41	RES-4.32K 1% 100PPM FILM	1075-0111	CAT.LIST	55-100
R 42	RES-7.5K 1% 100PPM FILM	1075-0158	CAT. LIST	55-100
R 43	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 44	RES-3.6K 5% 1/4W CC	1066-3625	ALLEN BRADLEY	CB3625
R 45	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 46	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 47	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 48	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 49	RES-20 OHM 5% 1/4W CC	1066-2005	ALLEN BRADLEY	CB2005
R 50	RES-430 OHM 5% 1/4W CC	1066-4315	ALLEN BRADLEY	CB 4315
R 52	RES-2.4K 5% 1/4W CC	1066-2425	ALLEN BRADLEY	CB2425
R 53	RES-8.2K 5% 1/4W CC	1066-8225	ALLEN BRADLEY	CB 8225
R 54	RES-8.2K 5% 1/4W CC	1066-8225	ALLEN BRADLEY	CB 8225
R 55	RES-8.2K 5% 1/4W CC	1066-8225	ALLEN BRADLEY	CB 8225

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 56	RES-510K 5% 1/4W CC	1066-5145	ALLEN BRADLEY	CB 5145
R 57	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 58	RES-560 OHM 5% 1/4W CC	1066-5615	ALLEN BRADLEY	CB 5615
R 59	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 60	RES-560 OHM 5% 1/4W CC	1066-5615	ALLEN BRADLEY	CB 5615
R 61	RES-24K 5% 1/4W CC	1066-2435	ALLEN BRADLEY	CB2435
R 62	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 63	RES-3.6K 5% 1/4W CC	1066-3625	ALLEN BRADLEY	CB3625
R 64	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 65	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 66	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 67	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 68	RES-430 OHM 5% 1/4W CC	1066-4315	ALLEN BRADLEY	CB 4315
R 69	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 70	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 71	RES-620 OHM 5% 1/4W CC	1066-6215	ALLEN BRADLEY	CB 6215
R 72	RES-430 OHM 5% 1/4W CC	1066-4315	ALLEN BRADLEY	CB 4315
R 73	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 74	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 75	RES-620 OHM 5% 1/4W CC	1066-6215	ALLEN BRADLEY	CB 6215
R 76	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 77	RES-62 OHM 5% 1/4W CC	1066-6205	ALLEN BRADLEY	CB 6205
	TRANSFORMER			
T 1	ASSY-TRIFILAR COIL	1579-0017		
T 2	ASSY-TRIFILAR COIL	1579-0017		
T 3	ASSY-TRIFILAR COIL	1579-0017		
T 4	ASSY-TRIFILAR COIL	1579-0017		
	INTEGRATED CIRCUIT			
U 1	IC- 74LS73 DUAL J-K FLIP FLOP	2025-0319	TI	74LS73
U 2	IC- 74LS73 DUAL J-K FLIP FLOP	2025-0319	TI	74LS73
U 3	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 4	IC-OP-08 8 PIN CAN OP AMPL	2025-0187	PRECISION MONOLITHIC	OP-0865
U 5	IC-5534A 8PIN DIP LOW NOISE OP AMPL	2025-0198	SIGNETICS	NE5534AN
U 6	IC-5534A 8PIN DIP LOW NOISE OP AMPL	2025-0198	SIGNETICS	NE5534AN
U 7	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 8	IC-MC1455P1 TIMING CIRCUIT	2025-0091	MOTOROLA	MC1455P1
U 9	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
	MIXER			
Z 1	MXR-SBL-1 DBL BAL 1-500MHZ	2010-0009	MINI-CIRCUITS LAB	SBL-1



NOTE
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT TYPICAL VALUE SHOWN
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.

Figure 6-23. 29000 Loops A and B VCO Phase Detector.

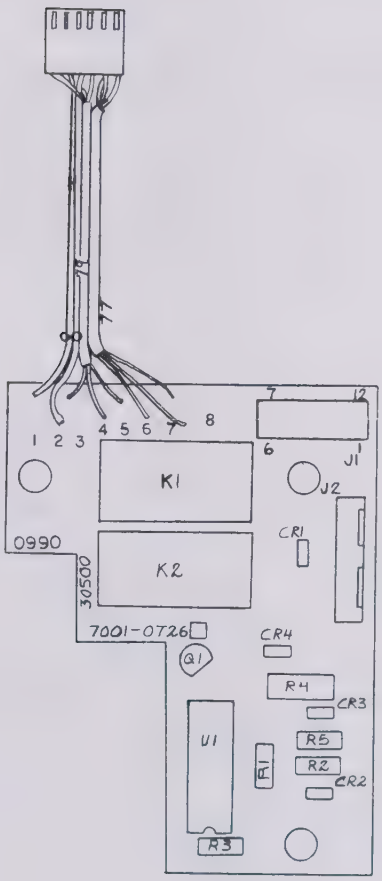
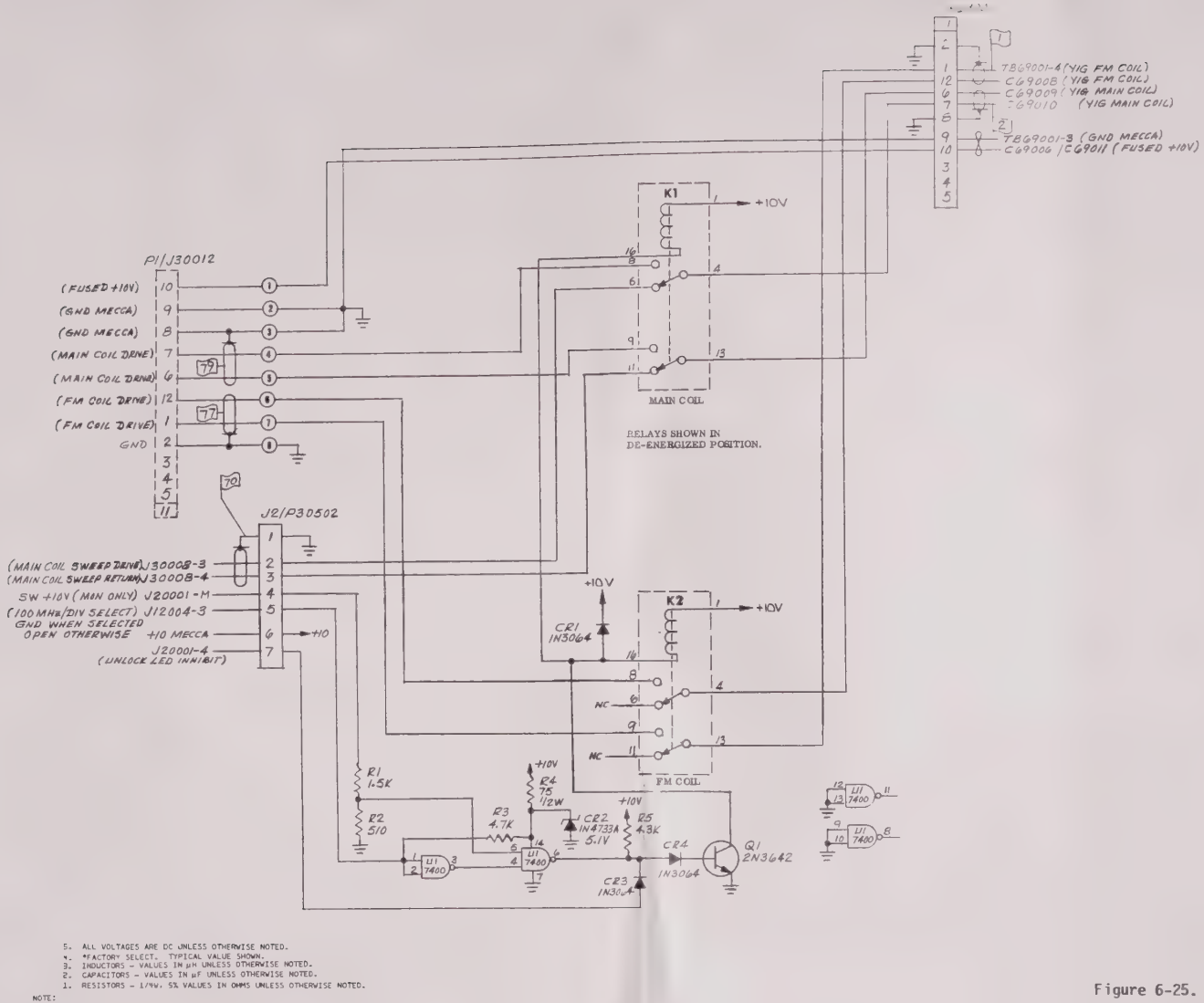


Figure 6-24. 30500 PCB Sweeper Relay, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
30500	PCB ASSY - SWEEPER RELAY	7001-0726	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0990	CUSHMAN	
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N4733A SI ZENER D041 5.1V 5% 1W	1281-0031	MOTOROLA	1N4733A
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	CONNECTOR			
J 1	CONN-12 (2X6)PIN .1X.1SP STR PCB MT JK	2535-0110	AMP	87227-6
J 2	CONN-7 PIN .1SP STR LKG PCB MT JK	2535-0147	METHODE	1100-8-107-01
	RELAY			
K 1	RLY-DPDT 9VDC COIL 2C 1A PCB MT	1313-0033	AROMAT	DS2E-M-DC9V
K 2	RLY-DPDT 9VDC COIL 2C 1A PCB MT	1313-0033	AROMAT	DS2E-M-DC9V
	TRANSISTOR			
Q 1	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
	RESISTOR			
R 1	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 2	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 3	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 4	RES-75 OHM 5% 1/2W CC	1067-7505	ALLEN BRADLEY	EB7505
R 5	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
	INTEGRATED CIRCUIT			
U 1	IC-SN7400N TTL NAND GATES	2025-0003	TI	SN7400N



NOTE:

1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.

Figure 6-25. 30500 PCB Sweeper Relay.

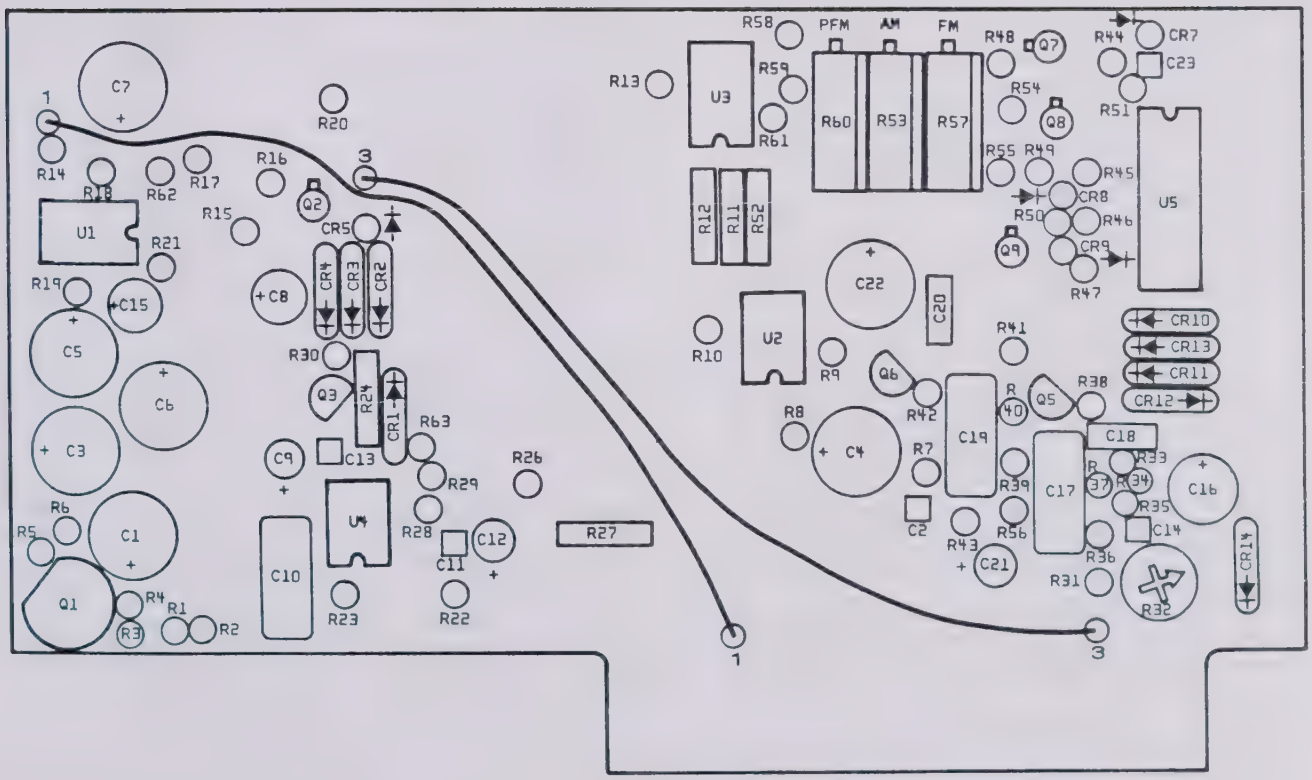
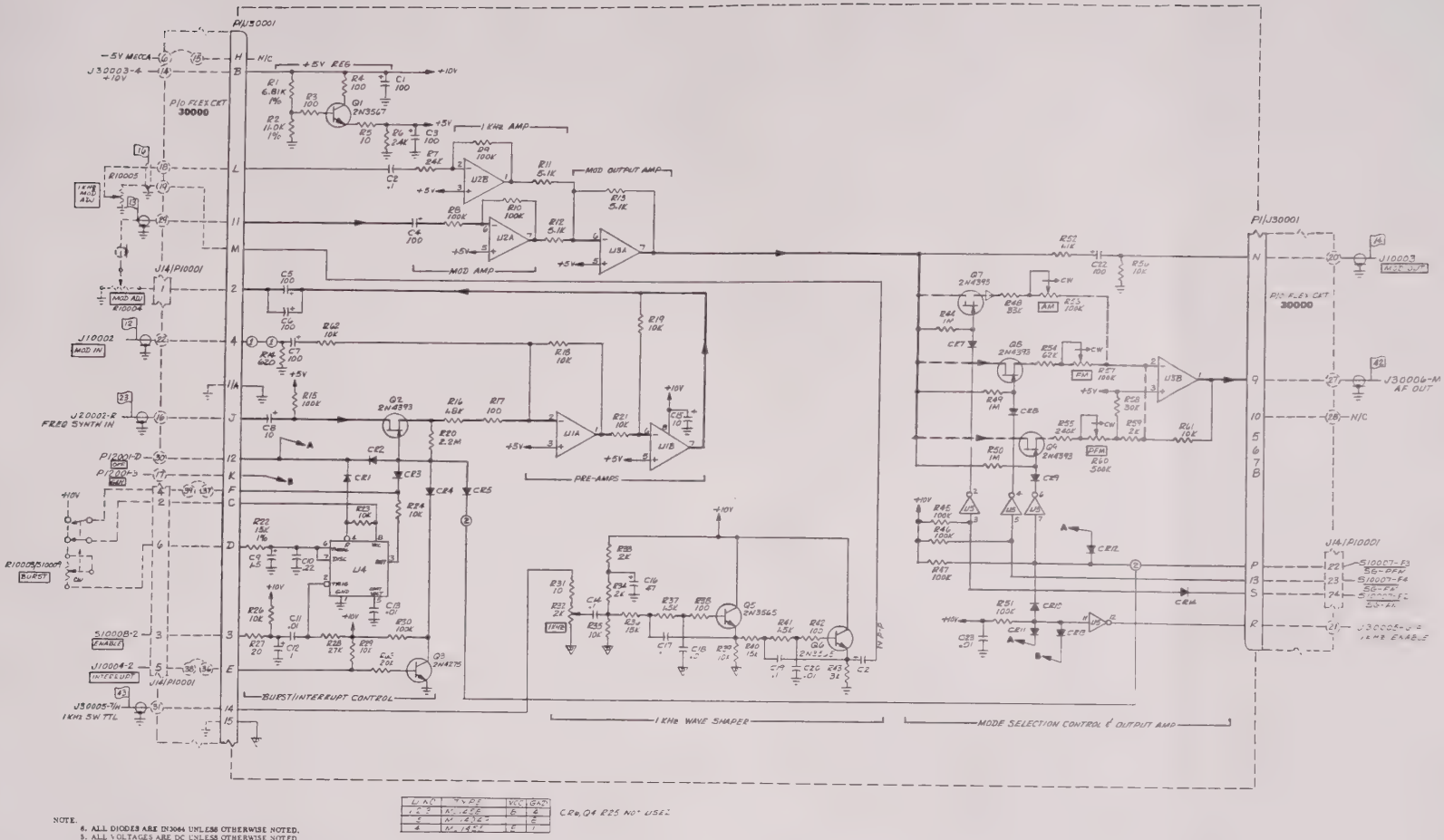


Figure 6-26. 31000 Audio Control, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
31000	PCB ASSY - AUDIO CONTROL	7001-0495	CUSHMAN	CE-50A, -1, /TG
	PRINTED CIRCUIT BOARD	1780-0858	CUSHMAN	
	CAPACITOR			
C 1	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 2	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 3	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 4	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 5	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 6	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 7	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 8	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 9	CAP-1.5UF 10% 35V AXL TANT	1013-0001	SPRAGUE	150D155X9035B2
C 10	CAP-.22UF 10% 100V RDL MET-MYLAR	1008-0091	ELECTROCUBE	232A1B224K
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 15	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 16	CAP-47UF 20% 20V RDL TANT	1011-0009	DICKSON	D47GS1C20M
C 17	CAP-.1UF 10% 100V RDL MET-POLYESTER	1008-0098	PLESSEY	60C104K100
C 18	CAP-.01UF 10% 200V MLD CER	1005-0065	AEROVOX	CK06BX103K
C 19	CAP-.1UF 10% 100V RDL MET-POLYESTER	1008-0098	PLESSEY	60C104K100
C 20	CAP-.01UF 10% 200V MLD CER	1005-0065	AEROVOX	CK06BX103K
C 21	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 22	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 23	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 10	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 11	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 12	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 13	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 14	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	TRANSISTOR			
Q 1	XSTR-2N3567 NPN SI TO 105 LOW PWR	1272-0014		
Q 2	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 3	XSTR-2N4275 NPN SI R110 LOW PWR/SW	1272-0016	FAIRCHILD	2N4275
Q 5	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 6	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 7	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 8	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 9	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
	RESISTOR			
R 1	RES-6.81K 1% 100PPM FILM	1075-0140	CAT. LIST	55-100
R 2	RES-11K 1% 100PPM FILM	1074-0106	CAT.LIST	55-100

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 3	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 4	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 5	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 6	RES-2.4K 5% 1/4W CC	1066-2425	ALLEN BRADLEY	CB2425
R 7	RES-24K 5% 1/4W CC	1066-2435	ALLEN BRADLEY	CB2435
R 8	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 9	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 10	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 11	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 12	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 13	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 14	RES-620 OHM 5% 1/4W CC	1066-6215	ALLEN BRADLEY	CB 6215
R 15	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 16	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 17	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 18	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 19	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 20	RES-2.2MEG 5% 1/4W CC	1066-2255	ALLEN BRADLEY	CB2255
R 21	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 22	RES-15K 1% 100PPM FILM	1075-0081	CAT.LIST	55-100
R 23	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 24	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 26	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 27	RES-20 OHM 5% 1/4W CC	1066-2005	ALLEN BRADLEY	CB2005
R 28	RES-27K 5% 1/4W CC	1066-2735	ALLEN BRADLEY	CB2735
R 29	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 30	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 31	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 32	POT-2K 20% 1/2W 1T CERMET TRMR	1203-0072	BECKMAN	91A-R2K
R 33	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 34	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 35	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 36	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 37	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 38	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 39	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 40	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 41	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 42	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 43	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 44	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 45	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 46	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 47	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 48	RES-33K 5% 1/4W CC	1066-3335	ALLEN BRADLEY	CB3335
R 49	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H ONLY
R 50	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H ONLY
R 51	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 52	RES-1.1K 5% 1/4W CC	1066-1125	ALLEN BRADLEY	CB1127
R 53	POT-100K 10% 3/4W 15T CERMET TRMR	1215-0006	BECKMAN	89WR
R 54	RES-62K 5% 1/4W CC	1066-6235	ALLEN BRADLEY	CB 6235
R 55	RES-240K 5% 1/4W CC	1066-2445	ALLEN BRADLEY	CB2445
R 56	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 57	POT-100K 10% 3/4W 15T CERMET TRMR	1215-0006	BECKMAN	89WR
R 58	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 59	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 60	POT-500K 10% 3/4W 15T CERMET TRMR	1215-0041	BECKMAN	89WR500K

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 61	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 62	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 63	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
	INTEGRATED CIRCUIT			
U 1	IC-1458 DUAL OP AMP 8PIN DIP	2025-0058	RAYTHEON	RC1458NB
U 2	IC-1458 DUAL OP AMP 8PIN DIP	2025-0058	RAYTHEON	RC1458NB
U 3	IC-1458 DUAL OP AMP 8PIN DIP	2025-0058	RAYTHEON	RC1458NB
U 4	IC-MC1455P1 TIMING CIRCUIT	2025-0091	MOTOROLA	MC1455P1
U 5	IC-4049 16 PIN DIP HEX INVT/BUFFER	2025-0189	MOTOROLA	MC14049UBP



LAC	TYPE	VCC	GAT
1,2,3	NAND	8	4
2	NAND	8	2
4	NAND	5	1

CR11, Q4 R25 NOT USED

NOTE.
6. ALL DIODES ARE IN3064 UNLESS OTHERWISE NOTED.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-27. 31000 Audio Control.

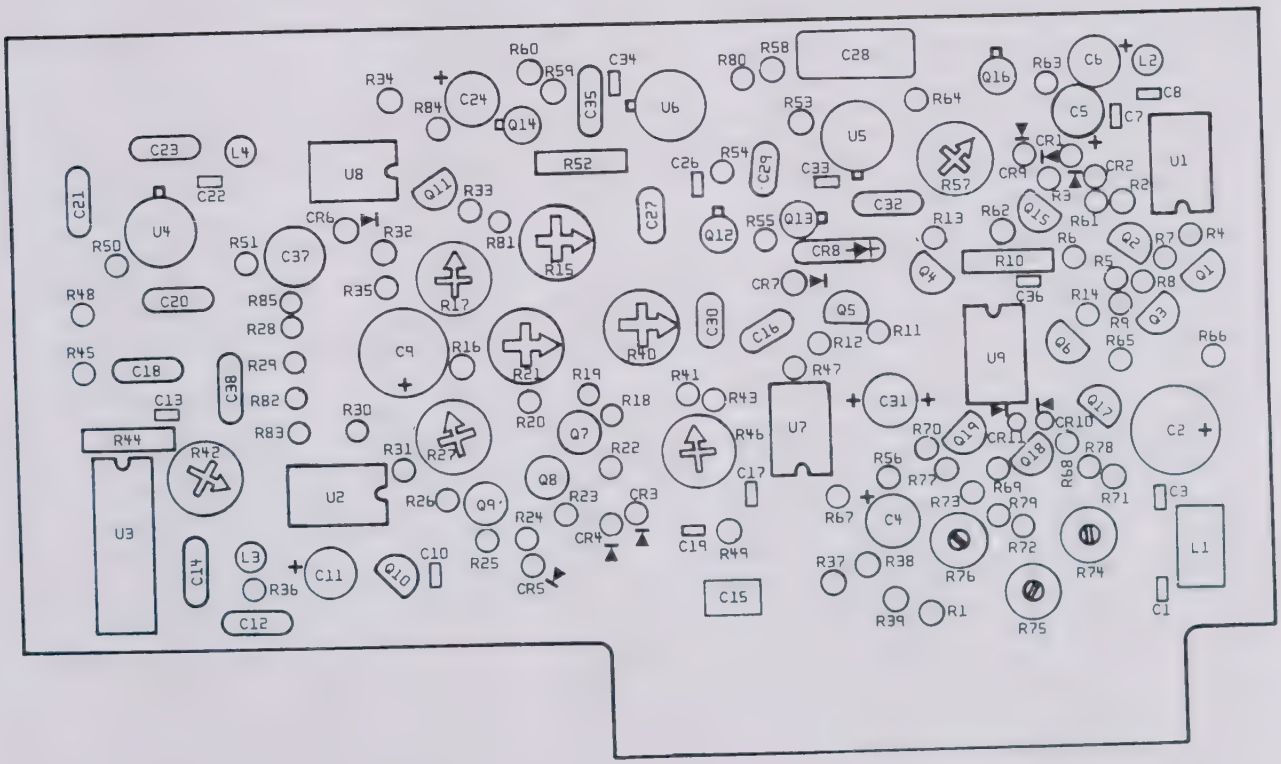


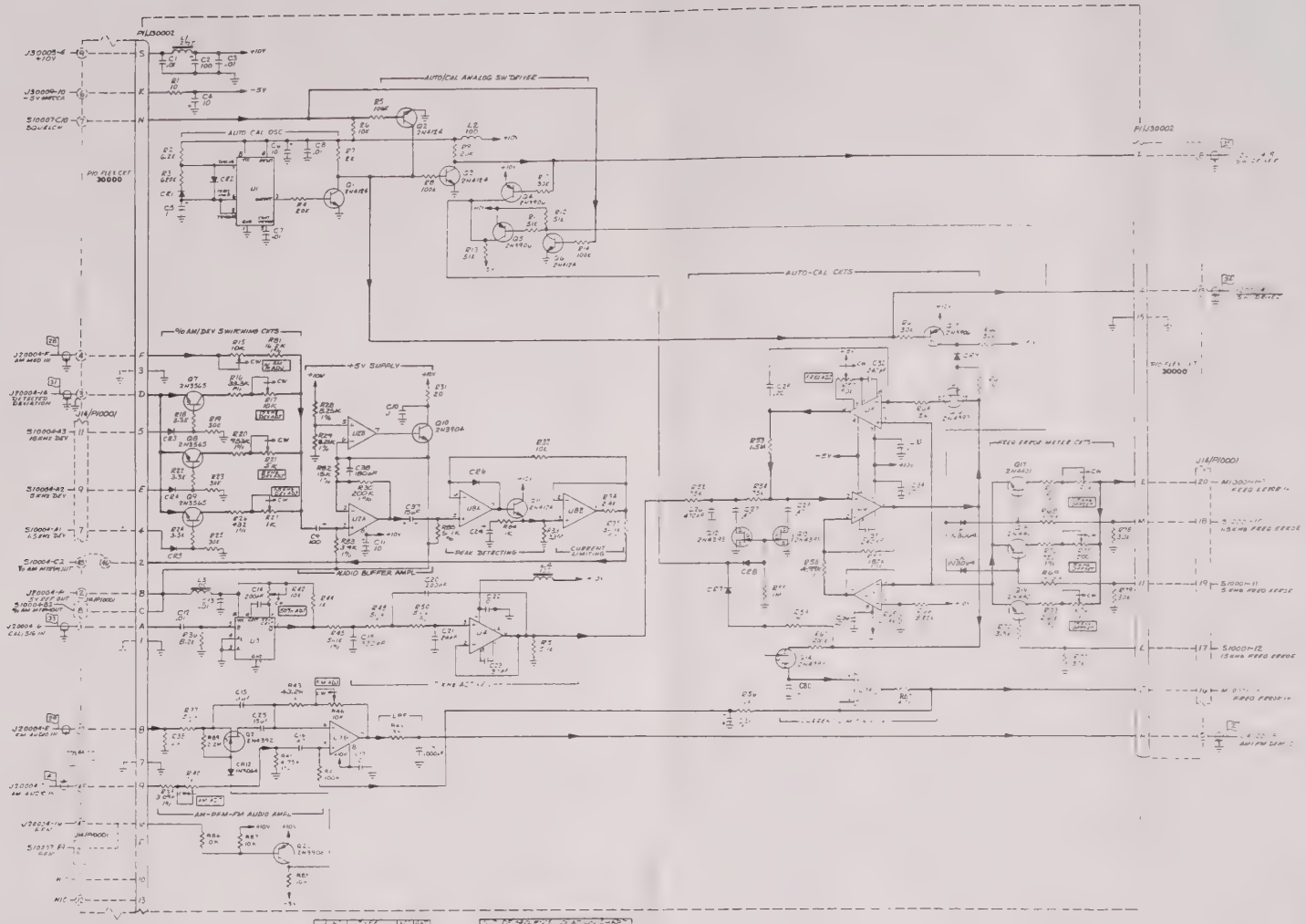
Figure 6-28. 32000 FM/AM Detector No. 2, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
32000	PCB ASSY - FM/AM DETECTOR NO. 2	7001-0700	CUSHMAN	CE-50A, -1, /TG
	PRINTED CIRCUIT BOARD	1780-1086	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 5	CAP-1UF -10+50% 50V RDL ELCTLT	1013-0047	PANASONIC	ECEA1HV010S
C 6	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 10	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 11	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 12	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 15	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 16	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0119	ELECTROCUBE	230B1B474K
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-330PF 5% 500V DIP MICA	1002-0032	ELMENCO	DM15-F-331J
C 19	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 20	CAP-1200PF 5% 500V DIP MICA	1002-0090	ELMENCO	DM19-F-122J
C 21	CAP-24PF 5% 500V DIP MICA	1002-0051	ELMENCO	DM15-C-240J
C 22	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 23	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 24	CAP-1UF -10+50% 50V RDL ELCTLT	1013-0047	PANASONIC	ECEA1HV010S
C 25	CAP-15UF +100-10% 25V RDL NP ELCTLT	1013-0042	ALLINS INDUSTRIES	CSR-NP15-25-I
C 26	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 27	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0119	ELECTROCUBE	230B1B474K
C 28	CAP-.22UF 10% 100V RDL MET-MYLAR	1008-0091	ELECTROCUBE	232A1B224K
C 29	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0119	ELECTROCUBE	230B1B474K
C 30	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0119	ELECTROCUBE	230B1B474K
C 31	CAP-15UF +100-10% 25V RDL NP ELCTLT	1013-0042	ALLINS INDUSTRIES	CSR-NP15-25-I
C 32	CAP-240PF 5% 500V DIP MICA	1002-0030	ELMENCO	DM15-F-241J
C 33	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 34	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 35	CAP-240PF 5% 500V DIP MICA	1002-0030	ELMENCO	DM15-F-241J
C 36	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 37	CAP-15UF +100-10% 25V RDL NP ELCTLT	1013-0042	ALLINS INDUSTRIES	CSR-NP15-25-I
C 38	CAP-180PF 5% 500V DIP MICA	1002-0005	ELMENCO	DM15-F-181J
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 10	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 11	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 12	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	INDUCTOR			
L 1	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 2	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 3	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 4	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
	TRANSISTOR			
Q 1	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 2	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 3	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 4	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 5	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 6	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 7	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 8	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 9	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 10	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 11	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 12	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 13	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 14	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 15	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 16	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 17	XSTR-2N4401 NPN SI TO92 LOW PWR/SW	1272-0116	MOTOROLA	2N 4401
Q 18	XSTR-2N4401 NPN SI TO92 LOW PWR/SW	1272-0116	MOTOROLA	2N 4401
Q 19	XSTR-2N4401 NPN SI TO92 LOW PWR/SW	1272-0116	MOTOROLA	2N 4401
Q 20	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 21	XSTR-2N4392 SI T018 J-FET N-CHAN	1272-0054	TELEDYNE	2N4392
	RESISTOR			
R 1	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 2	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 3	RES-620K 5% 1/4W CC	1066-6245	ALLEN BRADLEY	CB 6245
R 4	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 5	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 6	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 7	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 8	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 9	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 10	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 11	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 12	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 13	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 14	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 15	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 16	RES-33.3K 1% 100PPM FILM	1075-0072	CAT.LIST	55-100
R 17	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 18	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 19	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 20	RES-9.53K 1% 100PPM FILM	1074-1001	CAT.LIST	55-100
R 21	POT-5K 20% 1/2W 1T CERMET TRMR	1203-0071	BECKMAN	91AP5K
R 22	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 23	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 24	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 25	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 26	RES-432 OHM 1% 100PPM FILM	1075-0142	CAT LIST	55-100
R 27	POT-1K 20% 1/2W 1T CERMET TRMR	1215-0058	BECKMAN	91AR1K
R 28	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 29	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 30	RES-200K 1% 100PPM FILM	1075-0148	CAT. LIST	55-100
R 31	RES-20 OHM 5% 1/4W CC	1066-2005	ALLEN BRADLEY	CB2005
R 32	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 33	RES-3.3MEG 5% 1/4W CC	1066-3355	ALLEN BRADLEY	CB3355
R 34	RES-2.4K 5% 1/4W CC	1066-2425	ALLEN BRADLEY	CB2425
R 35	RES-3.01K 1% 100PPM FILM	1075-0127	CAT. LIST	55-100
R 36	RES-8.2K 5% 1/4W CC	1066-8225	ALLEN BRADLEY	CB 8225
R 37	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 38	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 39	RES-3.09K 1% 100PPM FILM	1075-0091	CAT.LIST	55-100
R 40	POT-1K 20% 1/2W 1T CERMET TRMR	1215-0058	BECKMAN	91AR1K
R 41	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 42	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 43	RES-43.2K 1% 100PPM FILM	1075-0117		
R 44	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 45	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 46	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 47	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 48	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 49	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 50	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 51	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 52	RES-75K 5% 1/4W CC	1066-7535	ALLEN BRADLEY	CB 7535
R 53	RES-1.5MEG 5% 1/4W CC	1066-1555	ALLEN BRADLEY	CB1555
R 54	RES-75K 5% 1/4W CC	1066-7535	ALLEN BRADLEY	CB 7535
R 55	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 56	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 57	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 58	RES-4.99K 1% 100PPM FILM	1075-0095	CAT.LIST	55-100
R 59	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 60	RES-200K 5% 1/4W CC	1066-2045	ALLEN BRADLEY	CB2045
R 61	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 62	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 63	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 64	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 65	RES-2.74K 1% 100PPM FILM	1075-0071	CAT.LIST	55-025
R 66	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 67	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 68	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 69	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 70	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 71	RES-121 OHM 1% 100PPM FILM	1075-0006	CAT.LIST	55-100
R 72	RES-750 OHM 1% 100PPM FILM	1075-0043	CAT.LIST	55-100
R 73	RES-2.61K 1% 100PPM FILM	1075-0090	CAT.LIST	55-100
R 74	POT-100 OHM 10% 1/2W 1T CERMET TRMR	1215-0056	ALLEN BRADLEY	A2A101
R 75	POT-500 OHM 10% 1/2W 1T CERMET TRMR	1215-0051	ALLEN BRADLEY	A2A501
R 76	POT-1K 10% 1/2W 1T CERMET TRMR	1215-0052	ALLEN BRADLEY	A2A102
R 77	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 78	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 79	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 80	RES-182K 1% 100PPM FILM	1075-0147	CAT. LIST	55-100
R 81	RES-16.2K 1% 100PPM FILM	1075-0057	CAT.LIST	55-100
R 82	RES-15K 1% 100PPM FILM	1075-0081	CAT.LIST	55-100

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 83	RES-3.4K 1% 100PPM FILM	1075-0020	CAT.LIST	55-100
R 84	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 85	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 86	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 87	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 88	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 89	RES-2.2MEG 5% 1/4W CC	1066-2255	ALLEN BRADLEY	CB2255
	INTEGRATED CIRCUIT			
U 1	IC-MC1455P1 TIMING CIRCUIT	2025-0091	MOTOROLA	MC1455P1
U 2	IC-1458 DUAL OP AMP 8PIN DIP	2025-0058	RAYTHEON	RC1458NB
U 3	IC-74121 14 PIN DIP MONOSTABLE MV	2025-0272	T.I	SN74121N
U 4	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 5	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 6	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 7	IC-TL082 8 PIN DIP BIFET OP AMPL	2025-0192	TI	TL082CP
U 8	IC-1458 DUAL OP AMP 8PIN DIP	2025-0058	RAYTHEON	RC1458NB
U 9	IC-1458 DUAL OP AMP 8PIN DIP	2025-0058	RAYTHEON	RC1458NB



NOTE:

1. ALL DIODES ARE 1N3064 UNLESS OTHERWISE NOTED.
2. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
3. * FACTORY SELECT. TYPICAL VALUE SHOWN.
4. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
5. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
6. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-29. 32000 FM/AM Detector No. 2.

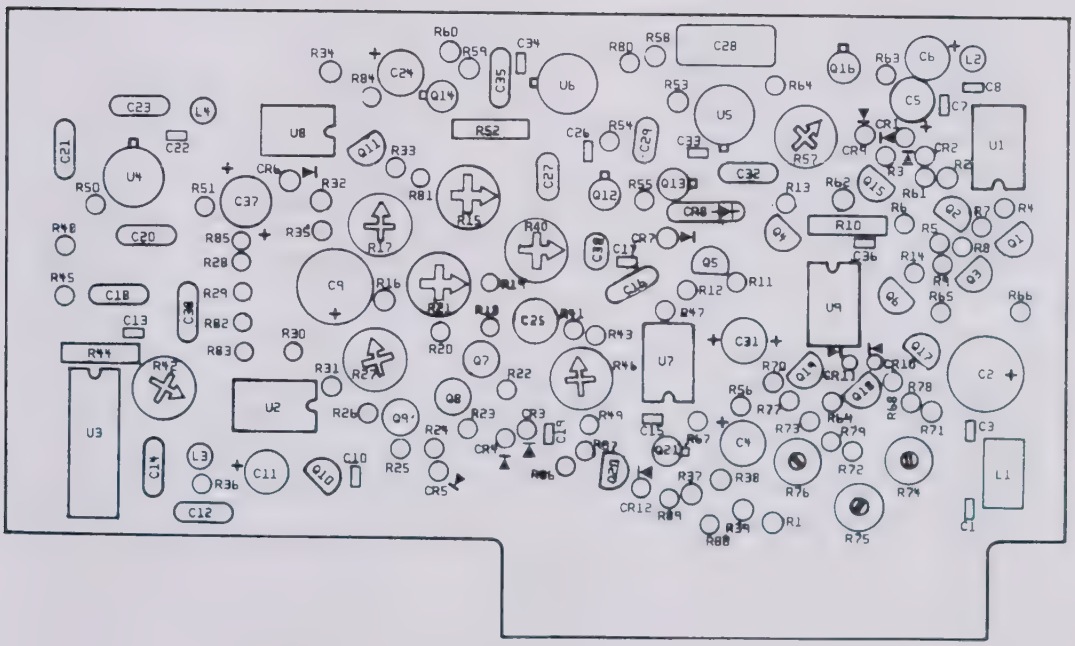


Figure 6-30. 32000 FM/AM Detector No. 2 (OP-04), Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 26	RES-130 OHM 1% 100PPM FILM	1075-0101	DALE	MFF-1/8
R 27	POT-2K 20% 1/2W 1T CERMET TRMR	1203-0072	BECKMAN	91A-R2K
R 28	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 29	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 30	RES-200K 1% 100PPM FILM	1075-0148	CAT. LIST	55-100
R 31	RES-20 OHM 5% 1/4W CC	1066-2005	ALLEN BRADLEY	CB2005
R 32	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 33	RES-3.3MEG 5% 1/4W CC	1066-3355	ALLEN BRADLEY	CB3355
R 34	RES-2.4K 5% 1/4W CC	1066-2425	ALLEN BRADLEY	CB2425
R 35	RES-3.01K 1% 100PPM FILM	1075-0127	CAT. LIST	55-100
R 36	RES-8.2K 5% 1/4W CC	1066-8225	ALLEN BRADLEY	CB 8225
R 37	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 38	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 39	RES-1.5K 1% 100PPM FILM	1075-0039	CAT.LIST	55-100
R 40	POT-2K 20% 1/2W 1T CERMET TRMR	1203-0072	BECKMAN	91A-R2K
R 41	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 42	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 43	RES-68.1K 1% 100PPM FILM	1075-0136	DALE	MFF 1/8 T1
R 44	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 45	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 46	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 47	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 48	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 49	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 50	RES-51.1K 1% 100PPM FILM	1075-0099	CAT.LIST	55-100
R 51	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 52	RES-75K 5% 1/4W CC	1066-7535	ALLEN BRADLEY	CB 7535
R 53	RES-1.5MEG 5% 1/4W CC	1066-1555	ALLEN BRADLEY	CB1555
R 54	RES-75K 5% 1/4W CC	1066-7535	ALLEN BRADLEY	CB 7535
R 55	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 56	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 57	POT-50K 20% 1/2W 1T CERMET TRMR	1203-0070	BECKMAN	91AR50K
R 58	RES-3.32K 1% 100PPM FILM	1075-0181	SHELLY RODABAUGH	RN55D
R 59	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 60	RES-200K 5% 1/4W CC	1066-2045	ALLEN BRADLEY	CB2045
R 61	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 62	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 63	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 64	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 65	RES-2.74K 1% 100PPM FILM	1075-0071	CAT.LIST	55-025
R 66	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 67	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 68	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 69	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 70	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 71	RES-51.1 OHM 1% 100PPM FILM	1075-0077	CAT.LIST	55-100
R 72	RES-750 OHM 1% 100PPM FILM	1075-0043	CAT.LIST	55-100
R 73	RES-2.61K 1% 100PPM FILM	1075-0090	CAT.LIST	55-100
R 74	POT-100 OHM 10% 1/2W 1T CERMET TRMR	1215-0056	ALLEN BRADLEY	A2A101
R 75	POT-5K 10% 1/2W 1T CERMET TRMR	1215-0053	ALLEN BRADLEY	A2A502
R 76	POT-5K 10% 1/2W 1T CERMET TRMR	1215-0053	ALLEN BRADLEY	A2A502
R 77	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 78	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 79	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 80	RES-182K 1% 100PPM FILM	1075-0147	CAT. LIST	55-100
R 81	RES-16.2K 1% 100PPM FILM	1075-0057	CAT.LIST	55-100
R 82	RES-15K 1% 100PPM FILM	1075-0081	CAT.LIST	55-100

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	INDUCTOR			
L 1	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 2	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 3	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 4	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
	TRANSISTOR			
Q 1	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 2	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 3	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 4	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 5	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 6	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 7	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 8	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 9	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 10	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 11	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 12	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 13	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 14	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 15	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 16	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 17	XSTR-2N4401 NPN SI TO92 LOW PWR/SW	1272-0116	MOTOROLA	2N 4401
Q 18	XSTR-2N4401 NPN SI TO92 LOW PWR/SW	1272-0116	MOTOROLA	2N 4401
Q 19	XSTR-2N4401 NPN SI TO92 LOW PWR/SW	1272-0116	MOTOROLA	2N 4401
Q 20	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 21	XSTR-2N4392 SI T018 J-FET N-CHAN	1272-0054	TELEDYNE	2N4392
	RESISTOR			
R 1	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 2	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 3	RES-620K 5% 1/4W CC	1066-6245	ALLEN BRADLEY	CB 6245
R 4	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 5	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 6	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 7	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 8	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 9	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 10	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 11	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 12	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 13	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 14	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 15	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 16	RES-33.3K 1% 100PPM FILM	1075-0072	CAT.LIST	55-100
R 17	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 18	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 19	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 20	RES-9.53K 1% 100PPM FILM	1074-1001	CAT.LIST	55-100
R 21	POT-10K 20% 1/2W 1T CERMET TRMR	1215-0043	BECKMAN	91AR10K
R 22	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 23	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 24	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 25	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
32000	PCB ASSY - TONE GEN SW MTG/DC PWR	7001-0703	CUSHMAN	
	PRINTED CIRCUIT BOARD	1780-1072	CUSHMAN	CE-50 FAMILY*
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 5	CAP-1UF -10+50% 50V RDL ELCTLT	1013-0047	PANASONIC	ECEA1HV010S
C 6	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 10	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 11	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 12	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 15	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 16	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-330PF 5% 500V DIP MICA	1002-0032	ELMENCO	DM15-F-331J
C 19	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 20	CAP-1200PF 5% 500V DIP MICA	1002-0090	ELMENCO	DM19-F-122J
C 21	CAP-24PF 5% 500V DIP MICA	1002-0051	ELMENCO	DM15-C-240J
C 22	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 23	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 24	CAP-1UF -10+50% 50V RDL ELCTLT	1013-0047	PANASONIC	ECEA1HV010S
C 25	CAP-15UF +100-10% 25V RDL NP ELCTLT	1013-0042	ALLINS INDUSTRIES	CSR-NP15-25-1
C 26	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 27	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 28	CAP-.22UF 10% 100V RDL MET-MYLAR	1008-0091	ELECTROCUBE	232A1B224K
C 29	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 30	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 31	CAP-15UF +100-10% 25V RDL NP ELCTLT	1013-0042	ALLINS INDUSTRIES	CSR-NP15-25-1
C 32	CAP-240PF 5% 500V DIP MICA	1002-0030	ELMENCO	DM15-F-241J
C 33	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 34	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 35	CAP-240PF 5% 500V DIP MICA	1002-0030	ELMENCO	DM15-F-241J
C 36	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 37	CAP-15UF +100-10% 25V RDL NP ELCTLT	1013-0042	ALLINS INDUSTRIES	CSR-NP15-25-1
C 38	CAP-180PF 5% 500V DIP MICA	1002-0005	ELMENCO	DM15-F-181J
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 10	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 11	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 12	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064

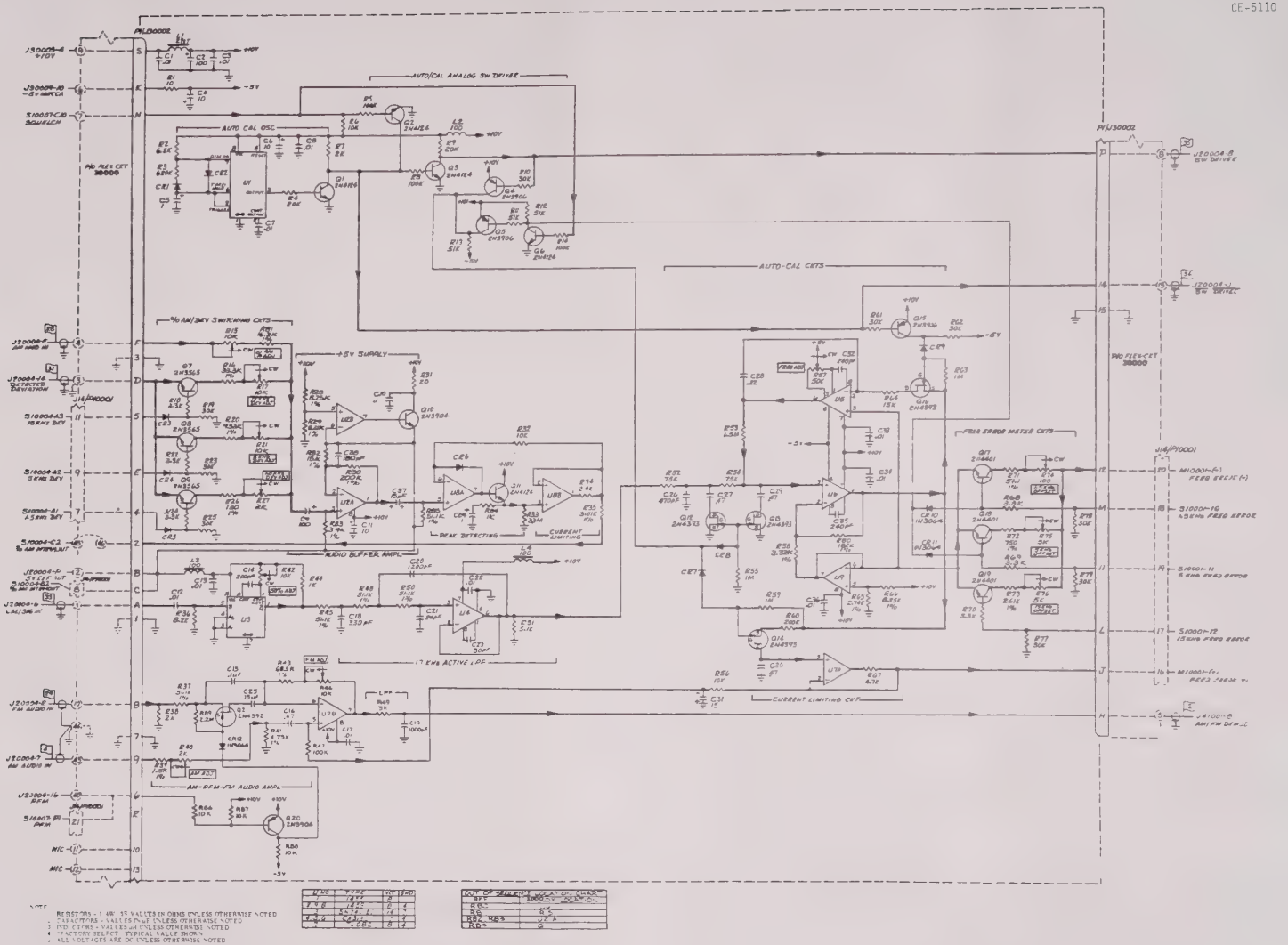


Figure 6-31. 32000 FM/AM Detector No. 2 (OP-04).

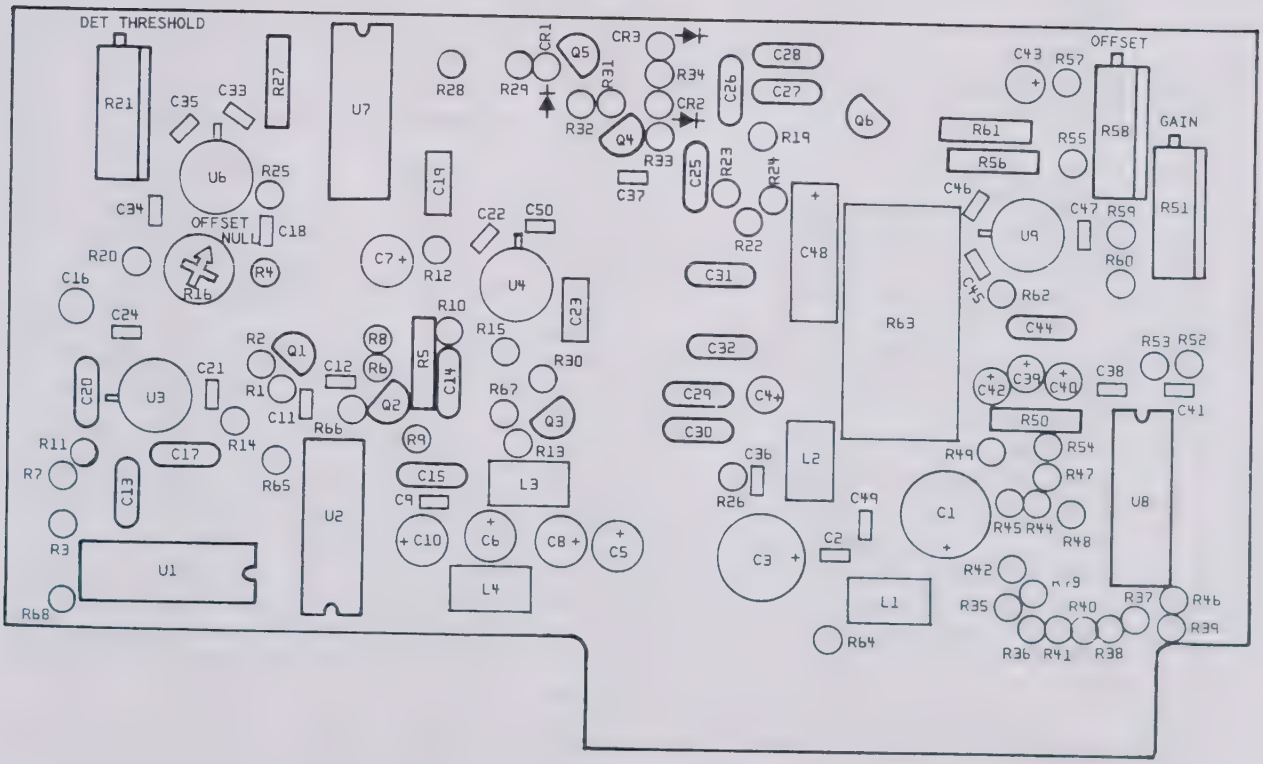
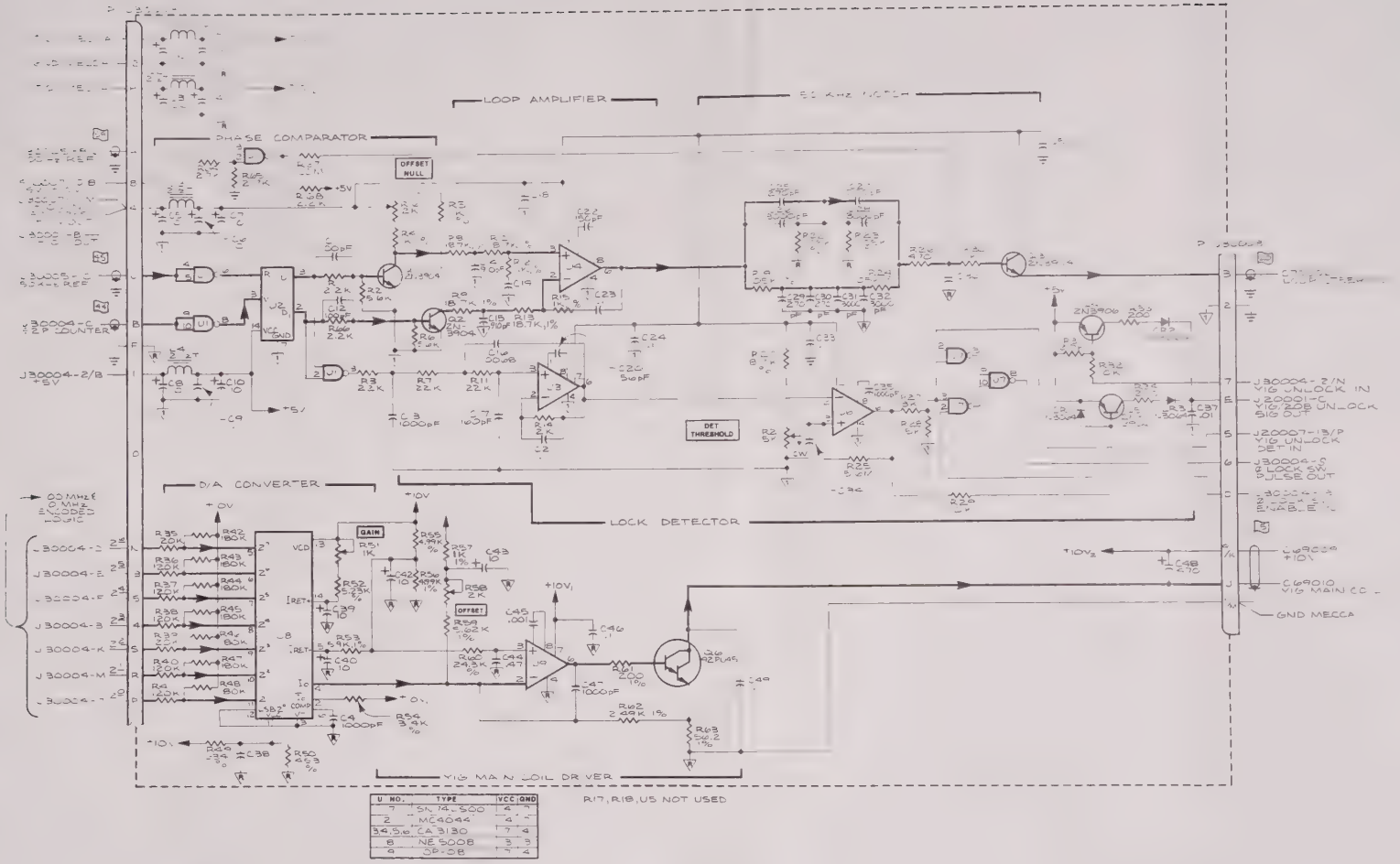


Figure 6-32. 33000 YIG Main Coil Driver, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
33000	PCB ASSY - YIG MAIN COIL DRIVER	7001-0576	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1061	CUSHMAN	
	CAPACITOR			
C 1	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 2	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 3	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 4	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 5	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 6	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 7	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 8	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 9	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 10	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 11	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 12	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 13	CAP-1000PF 5% 100V DIP MICA	1002-0015	ELMENCO	DM15-F-102J
C 14	CAP-910PF 5% 100V DIP MICA	1002-0062	ELMENCO	DM15-F-911J
C 15	CAP-910PF 5% 100V DIP MICA	1002-0062	ELMENCO	DM15-F-911J
C 16	CAP-.0068UF 10% 200V AXL POLYESTER	1008-0012	SPRAGUE	192P68292
C 17	CAP-160PF 5% 500V DIP MICA	1002-0091	ELMENCO	DM15-F-161J
C 18	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 19	CAP-.1UF 10% 100V RDL MET-POLYESTER	1008-0098	PLESSEY	60C104K100
C 20	CAP-56PF 5% 500V DIP MICA	1002-0019	ELMENCO	DM15-E-560J
C 21	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 22	CAP-150PF 10% 100V NPO MINTR CER	1005-0108	ERIE	8121-100-C0G0-151K
C 23	CAP-.1UF 10% 100V RDL MET-POLYESTER	1008-0098	PLESSEY	60C104K100
C 24	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 25	CAP-270PF 5% 500V DIP MICA	1002-0031	ELMENCO	DM15-F-2715
C 26	CAP-3000PF 5% 500V DIP MICA	1002-0088	ELMENCO	DM19-F-302J
C 27	CAP-270PF 5% 500V DIP MICA	1002-0031	ELMENCO	DM15-F-2715
C 28	CAP-3000PF 5% 500V DIP MICA	1002-0088	ELMENCO	DM19-F-302J
C 29	CAP-270PF 5% 500V DIP MICA	1002-0031	ELMENCO	DM15-F-2715
C 30	CAP-270PF 5% 500V DIP MICA	1002-0031	ELMENCO	DM15-F-2715
C 31	CAP-3000PF 5% 500V DIP MICA	1002-0088	ELMENCO	DM19-F-302J
C 32	CAP-3000PF 5% 500V DIP MICA	1002-0088	ELMENCO	DM19-F-302J
C 33	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 34	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 35	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 36	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 37	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 38	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 39	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 40	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 41	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 42	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 43	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 44	CAP-.47UF 10% 100V AXL MET-POLYES	1008-0119	ELECTROCUBE	230B1B474K
C 45	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 46	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 47	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 48	CAP-470UF 20% 6V AXL WET SLUG TANT	1011-0018	SWT	470-6-5B-M
C 49	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 50	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	DIODE			
CR 1	DIO-1N3064 SI SW D035 75PRV .25W	1281-0105	FAIRCHILD	1N3064 DO35 PKG
CR 2	DIO-1N3064 SI SW D035 75PRV .25W	1281-0105	FAIRCHILD	1N3064 DO35 PKG
CR 3	DIO-1N3064 SI SW D035 75PRV .25W	1281-0105	FAIRCHILD	1N3064 DO35 PKG
	INDUCTOR			
L 1	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 2	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 3	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 4	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
	TRANSISTOR			
Q 1	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 2	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 3	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 4	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 5	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 6	XSTR-92PU45 NPN SI DARLINGTON	1272-0113	NATIONAL	92PU45
	RESISTOR			
R 1	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 2	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 3	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 4	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 5	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 6	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 7	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 8	RES-18.7K 1% 150PPM FILM	1074-1022	CAT.LIST	55-100
R 9	RES-18.7K 1% 150PPM FILM	1074-1022	CAT.LIST	55-100
R 10	RES-18.7K 1% 150PPM FILM	1074-1022	CAT.LIST	55-100
R 11	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 12	RES-11K 1% 100PPM FILM	1074-0106	CAT.LIST	55-100
R 13	RES-18.7K 1% 150PPM FILM	1074-1022	CAT.LIST	55-100
R 14	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 15	RES-11K 1% 100PPM FILM	1074-0106	CAT.LIST	55-100
R 16	POT-2K 20% 1/2W 1T CERMET TRMR	1203-0072	BECKMAN	91A-R2K
R 19	RES-1.05K 1% 100PPM FILM	1075-0086	CAT.LIST	55-100
R 20	RES-78.7K 1% 100PPM FILM	1075-0060	CAT.LIST	55-100
R 21	POT-5K 10% 3/4W 15T CERMET TRMR	1215-0012	HELITRIM	89WR5K
R 22	RES-1.05K 1% 100PPM FILM	1075-0086	CAT.LIST	55-100
R 23	RES-1.05K 1% 100PPM FILM	1075-0086	CAT.LIST	55-100
R 24	RES-1.05K 1% 100PPM FILM	1075-0086	CAT.LIST	55-100
R 25	RES-5.6MEG 5% 1/4W CC	1066-5655	ALLEN BRADLEY	CB 5655
R 26	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 27	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 28	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 29	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 30	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 31	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 32	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 33	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 34	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 35	RES-120K 5% 1/4W CC	1066-1245	ALLEN BRADLEY	CB1245
R 36	RES-120K 5% 1/4W CC	1066-1245	ALLEN BRADLEY	CB1245
R 37	RES-120K 5% 1/4W CC	1066-1245	ALLEN BRADLEY	CB1245

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 38	RES-120K 5% 1/4W CC	1066-1245	ALLEN BRADLEY	CB1245
R 39	RES-120K 5% 1/4W CC	1066-1245	ALLEN BRADLEY	CB1245
R 40	RES-120K 5% 1/4W CC	1066-1245	ALLEN BRADLEY	CB1245
R 41	RES-120K 5% 1/4W CC	1066-1245	ALLEN BRADLEY	CB1245
R 42	RES-180K 5% 1/4W CC	1066-1845	ALLEN BRADLEY	CB1845
R 43	RES-180K 5% 1/4W CC	1066-1845	ALLEN BRADLEY	CB1845
R 44	RES-180K 5% 1/4W CC	1066-1845	ALLEN BRADLEY	CB1845
R 45	RES-180K 5% 1/4W CC	1066-1845	ALLEN BRADLEY	CB1845
R 46	RES-180K 5% 1/4W CC	1066-1845	ALLEN BRADLEY	CB1845
R 47	RES-180K 5% 1/4W CC	1066-1845	ALLEN BRADLEY	CB1845
R 48	RES-180K 5% 1/4W CC	1066-1845	ALLEN BRADLEY	CB1845
R 49	RES-634 OHM 1% 150PPM FILM	1074-1042	CAT.LIST	55-100
R 50	RES-453 OHM 1% 100PPM FILM	1075-0107	CAT.LIST	55-100
R 51	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 52	RES-5.23K 1% 100PPM FILM	1075-0169	CAT. LIST	55-100
R 53	RES-5.9K 1% 100PPM FILM	1075-0110	CAT.LIST	55-100
R 54	RES-3.4K 1% 100PPM FILM	1075-0020	CAT.LIST	55-100
R 55	RES-4.99K 1% 25PPM FILM	1074-1027	CAT.LIST	55-025
R 56	RES-4.99K 1% 25PPM FILM	1074-1027	CAT.LIST	55-025
R 57	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 58	POT-2K 10% 3/4W 15T CERMET TRMR	1215-0015	BECKMAN	89WR2K
R 59	RES-5.62K 1% 100PPM FILM	1075-0013	CAT.LIST	55-100
R 60	RES-24.3K 1% 100PPM FILM	1075-0097	CAT.LIST	55-100
R 61	RES-200 OHM 1% 100PPM FILM	1075-0082	CAT.LIST	55-100
R 62	RES-2.49K 1% 100PPM FILM	1075-0027	CAT.LIST	55-100
R 63	RES-56.2 OHM 1% 1W 2PPM AXL WW	1157-0001	JORDAN	5-190+OR-2PPM 1%
R 64	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 65	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 66	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 67	RES-22MEG 5% 1/4W CC	1066-2265	ALLEN BRADLEY	CB2265
R 68	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
	INTEGRATED CIRCUIT			
U 1	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 2	IC-MC4044P PHASE DETECTOR	2025-0066	MOTOROLA	MC4044
U 3	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 4	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 6	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 7	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 8	IC-08 16 PIN DIP D/A CONVERTER	2025-0188	SIGNETICS	NE5008
U 9	IC-OP-08 8 PIN CAN OP AMPL	2025-0187	PRECISION MONOLITHIC	OP-0865



NOTE:
1. RESISTORS - 1/4W, ±1% VALUES IN OHMS UNLESS OTHERWISE NOTED
2. CAPACITORS - VALUES IN µF UNLESS OTHERWISE NOTED
3. INDUCTORS - VALUES IN MICROHENRIES UNLESS OTHERWISE NOTED
4. RESISTORS SELECTED - TYPICAL VALUE SHOWN
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED

Figure 6-33. 33000 YIG Main Coil Driver.

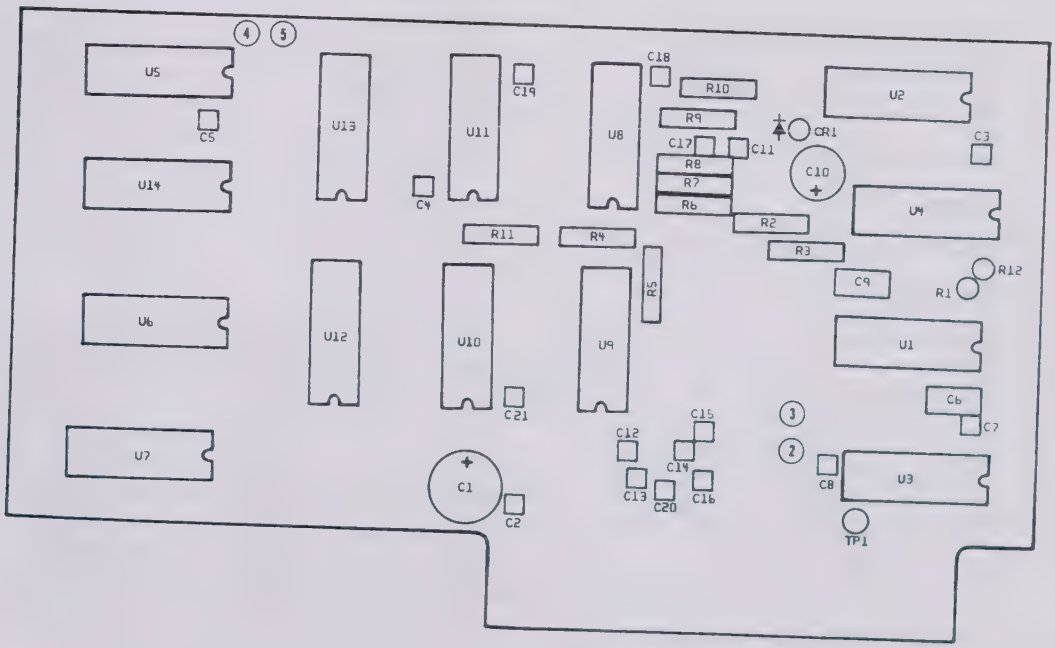
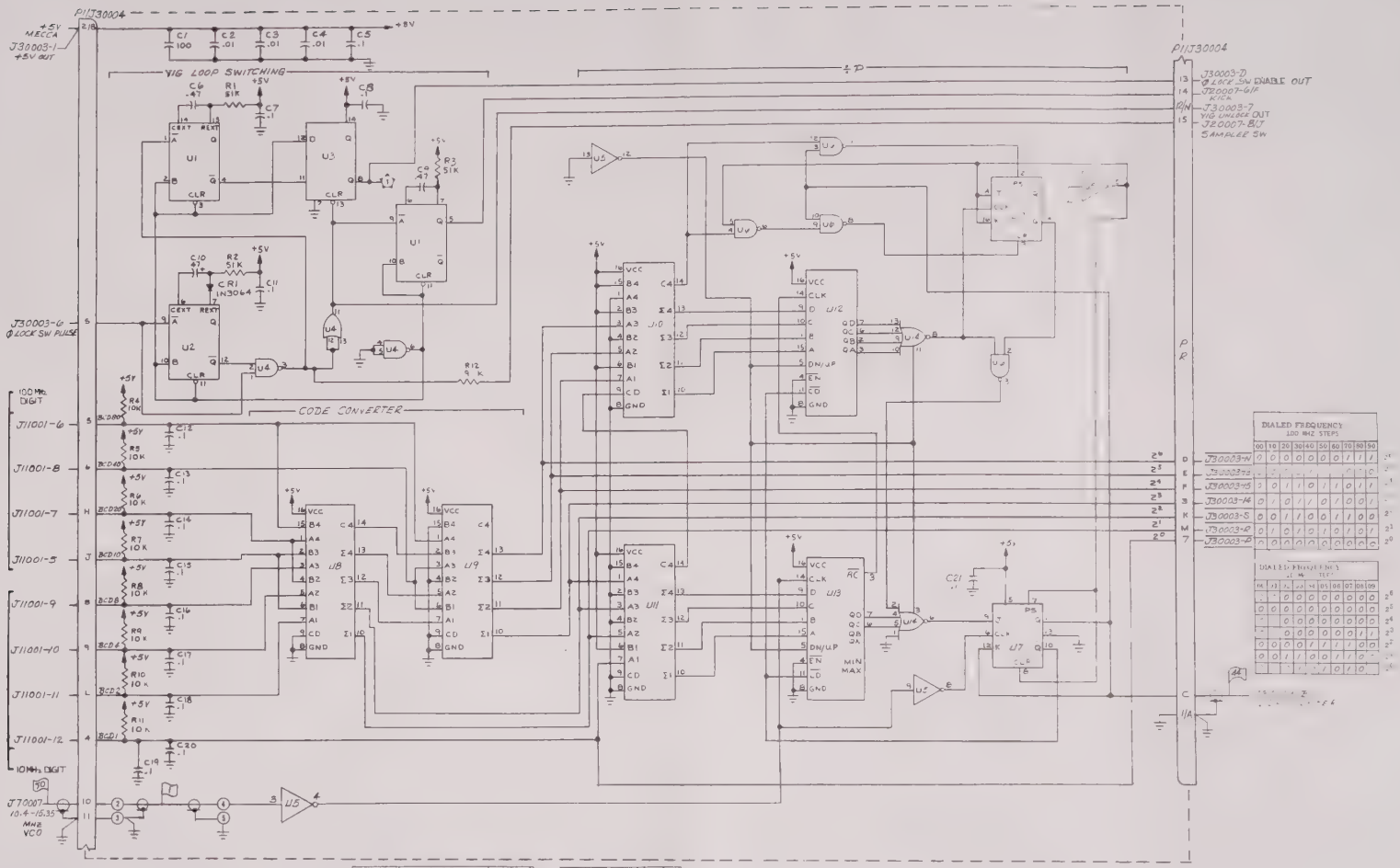


Figure 6-34. 34000 Digital Decode/Divide-By-P, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR NO.
34000	PCB ASSY - DIGIT DECODE/DIV-BY-P	7001-0649	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1096	CUSHMAN	
	CAPACITOR			
C 1	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 2	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 3	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 6	CAP-.47UF 10% 50V MLD CER	1005-0092	AERGVOX	CK06BX474K
C 7	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 8	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 9	CAP-.47UF 10% 50V MLD CER	1005-0092	AEROVOX	CK06BX474K
C 10	CAP-47UF 20% 20V RDL TANT	1011-0009	DICKSON	D47GS1C20M
C 11	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 12	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 13	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 14	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 15	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 16	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 17	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 18	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 19	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 20	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 21	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	RESISTOR			
R 1	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 2	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 3	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 4	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 5	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 6	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 7	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 8	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 9	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 10	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 11	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 12	RES-9.1K 5% 1/4W CC	1066-9125	ALLEN BRADLEY	CB 9125
	INTEGRATED CIRCUIT			
U 1	IC-74LS123 16 PIN DIP MONOSTABLE MV	2025-0186	TI	SN74LS123N
U 2	IC-74LS123 16 PIN DIP MONOSTABLE MV	2025-0186	TI	SN74LS123N
U 3	IC-74LS74 DUAL D POS &DGETRIGFFW/P&C	2025-0124	TEXAS INSTRUMENTS	SN74LS74N
U 4	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 5	IC-54LS04 14 PIN DIP HEX INVERTERS	2025-0270	TI	SN54LS04J
U 6	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 7	IC-74LS76 16 PIN DIP DUAL J-K FLIP FLO	2025-0185	TI	SN74LS76N
U 8	IC-4008 B16 PIN DIP 4-BIT FULL ADDER	2025-0183	MOTOROLA	MC14008BCP
U 9	IC-4008 B16 PIN DIP 4-BIT FULL ADDER	2025-0183	MOTOROLA	MC14008BCP
U 10	IC-4008 B16 PIN DIP 4-BIT FULL ADDER	2025-0183	MOTOROLA	MC14008BCP

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
U 11	IC-4008 B16 PIN DIP 4-BIT FULL ADDER	2025-0183	MOTOROLA	MC14008BCP
U 12	IC-SN74LS191N SYN UP/DOWN COUNTERS	2025-0115	TI	SN74LS191N
U 13	IC-SN74LS191N SYN UP/DOWN COUNTERS	2025-0115	TI	SN74LS191N
U 14	IC-7425 14 PIN DIP DUAL 4-INP NOR GATE	2025-0184	TI	SN7425N



U NO	TYPE	VCC	GND
1,2	74LS27	14	8
3	74LS74	14	7
4,6	74LS00	14	7
8,9,10,11	74LS08	14	8
12,13	74LS[illegible]	14	8
5	74LS[illegible]4	14	7
4	74LS[illegible]	14	7

5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN µH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN µF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

NOTE

Figure 6-35. 34000 Digital Decode/Divide-By-P.

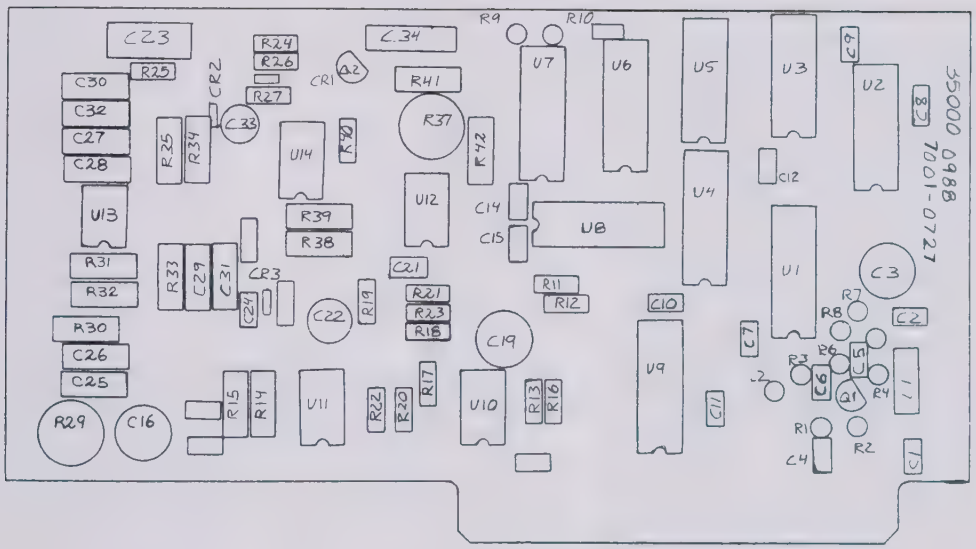
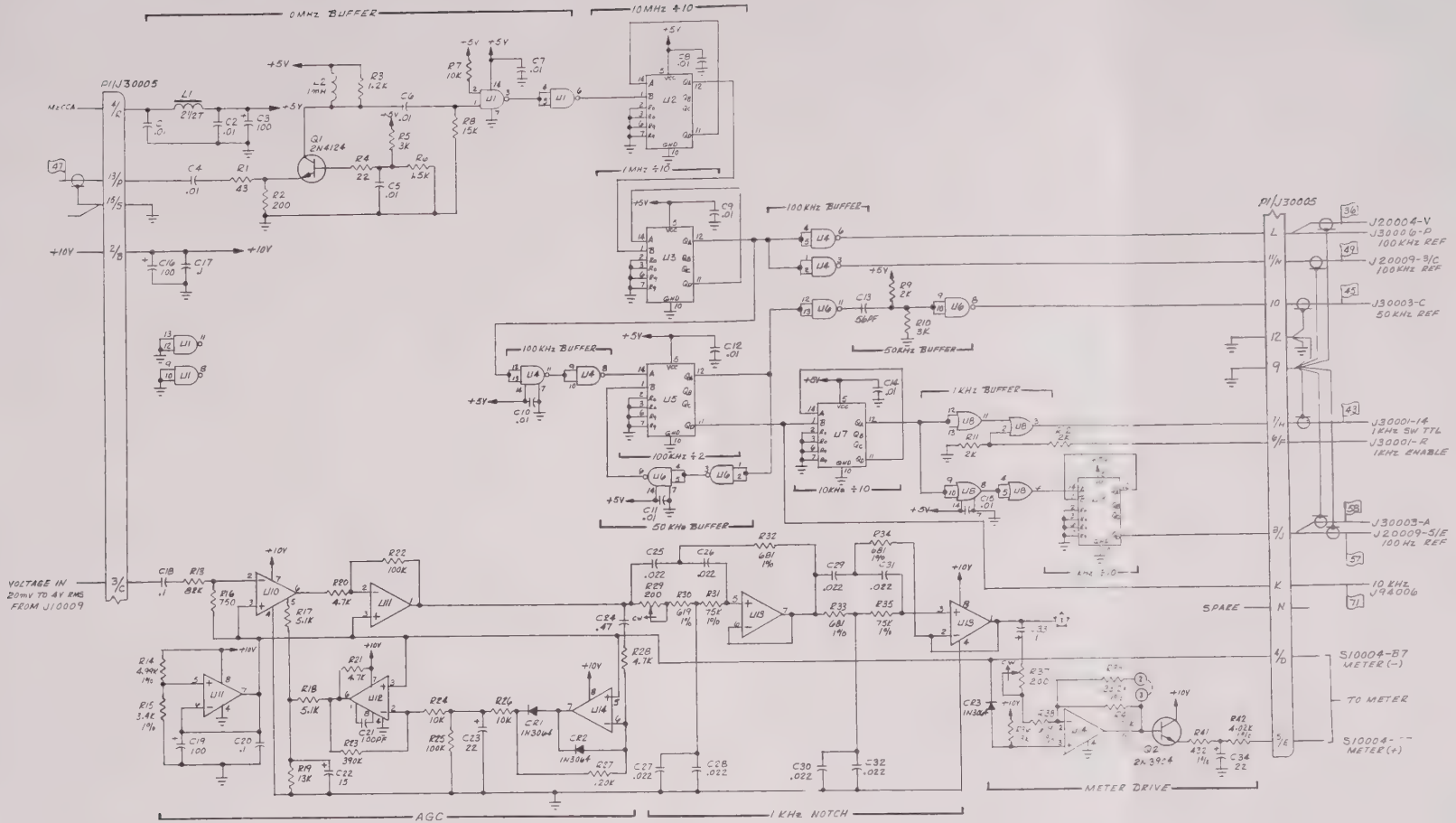


Figure 6-36. 35000 Reference Frequency Divider/SINAD, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
35000	PCB ASSY - REF FREQ DIVIDER/SINAD	7001-0727	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0988	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 3	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-56PF 10% 100V NPO MINTR CER	1005-0109	TUSONIX	8121-100-C0G0-560K
C 14	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 15	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 16	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 17	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 18	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 19	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 20	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 21	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 22	CAP-15UF +100-10% 25V RDL NP ELCTLT	1013-0042	ALLINS INDUSTRIES	CSR-NP15-25-I
C 23	CAP-22UF 10% 15V AXL TANT	1011-0003	SPRAGUE	150D226X9015B2
C 24	CAP-.47UF 10% 50V MLD CER	1005-0092	AEROVOX	CK06BX474K
C 25	CAP-.022UF 1% 100V AXL MET-MYLAR	1008-0082	CAPCO	MME.022MF100V 1%
C 26	CAP-.022UF 1% 100V AXL MET-MYLAR	1008-0082	CAPCO	MME.022MF100V 1%
C 27	CAP-.022UF 1% 100V AXL MET-MYLAR	1008-0082	CAPCO	MME.022MF100V 1%
C 28	CAP-.022UF 1% 100V AXL MET-MYLAR	1008-0082	CAPCO	MME.022MF100V 1%
C 29	CAP-.022UF 1% 100V AXL MET-MYLAR	1008-0082	CAPCO	MME.022MF100V 1%
C 30	CAP-.022UF 1% 100V AXL MET-MYLAR	1008-0082	CAPCO	MME.022MF100V 1%
C 31	CAP-.022UF 1% 100V AXL MET-MYLAR	1008-0082	CAPCO	MME.022MF100V 1%
C 32	CAP-.022UF 1% 100V AXL MET-MYLAR	1008-0082	CAPCO	MME.022MF100V 1%
C 33	CAP-1UF -10+50% 50V RDL ELCTLT	1013-0047	PANASONIC	ECEA1HV010S
C 34	CAP-22UF 10% 15V AXL TANT	1011-0003	SPRAGUE	150D226X9015B2
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	INDUCTOR			
L 1	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 2	CH-1000UH 5% RF MLD AXL .19DX.44L	1585-0020	DELEVAN	2500-28
	TRANSISTOR			
Q 1	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 2	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
	RESISTOR			
R 1	RES-43 OHM 5% 1/4W CC	1066-4305	ALLEN BRADLEY	CB 4305
R 2	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 3	RES-1.2K 5% 1/4W CC	1066-1225	ALLEN BRADLEY	CB1225

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR	MFR. NO.
R 4	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
R 5	RES-3K 5% 1/4W CC	1066-3023	ALLEN BRADLEY	CB3025
R 6	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 7	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 8	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 9	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 10	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 11	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 12	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 13	RES-82K 5% 1/4W CC	1066-8235	ALLEN BRADLEY	CB 8235
R 14	RES-4.99K 1% 100PPM FILM	1075-0095	CAT.LIST	55-100
R 15	RES-3.4K 1% 100PPM FILM	1075-0020	CAT.LIST	55-100
R 16	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 17	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 18	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 19	RES-13K 5% 1/4W CC	1066-1335	ALLEN BRADLEY	CB1335
R 20	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 21	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 22	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 23	RES-390K 5% 1/4W CC	1066-3945	ALLEN BRADLEY	CB 3945
R 24	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 25	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 26	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 27	RES-120K 5% 1/4W CC	1066-1245	ALLEN BRADLEY	CB1245
R 28	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 29	POT-200 OHM 20% 1/2W 1T CERMET TRMR	1215-0055	BECKMAN	91AR200
R 30	RES-619 OHM 1% 100PPM FILM	1075-0063	CAT.LIST	55-100
R 31	RES-75K 1% 100PPM FILM	1075-0135	CAT. LIST	55-100
R 32	RES-681 OHM 1% 100PPM FILM	1075-0164	CAT. LIST	55-100
R 33	RES-681 OHM 1% 100PPM FILM	1075-0164	CAT. LIST	55-100
R 34	RES-681 OHM 1% 100PPM FILM	1075-0164	CAT. LIST	55-100
R 35	RES-75K 1% 100PPM FILM	1075-0135	CAT. LIST	55-100
R 36	RES-13K 5% 1/4W CC	1066-1335	ALLEN BRADLEY	CB1335
R 37	POT-200 OHM 20% 1/2W 1T CERMET TRMR	1215-0055	BECKMAN	91AR200
R 38	RES-619 OHM 1% 100PPM FILM	1075-0063	CAT.LIST	55-100
R 39	RES-33.2K 1% 100PPM FILM	1075-0098	CAT.LIST	55-100
R 40	RES-100K 1% 100PPM FILM	1075-0105	CAT.LIST	55-100
R 41	RES-432 OHM 1% 100PPM FILM	1075-0142	CAT LIST	55-100
R 42	RES-4.02K 1% 100PPM FILM	1075-0094	CAT.LIST	55-100
	INTEGRATED CIRCUIT			
U 1	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 2	IC-SN74LS90N DECADE COUNTER	2025-0113	TI	SN74LS90N
U 3	IC-SN74LS90N DECADE COUNTER	2025-0113	TI	SN74LS90N
U 4	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 5	IC-SN74LS90N DECADE COUNTER	2025-0113	TI	SN74LS90N
U 6	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 7	IC-SN74LS90N DECADE COUNTER	2025-0113	TI	SN74LS90N
U 8	IC-SN74LS32N QUAD 2-INPUT POS-OR GATE	2025-0085	TI	SN74LS32N
U 9	IC-SN74LS90N DECADE COUNTER	2025-0113	TI	SN74LS90N
U 10	IC-3080 8 PIN OP TRANSCOND AMPL	2025-0275	RCA	CA3080E
U 11	IC-1458 DUAL OP AMP 8PIN DIP	2025-0058	RAYTHEON	RC1458NB
U 12	IC-3130 8 PIN DIP OP AMPL	2025-0269	RCA	CA3130E
U 13	IC-1458 DUAL OP AMP 8PIN DIP	2025-0058	RAYTHEON	RC1458NB
U 14	IC-TL082 8 PIN DIP BIFET OP AMPL	2025-0192	TI	TL082CP



U NO	TYPE	VCC	GND
1,4,6	74LS00	4	7
2,3,5,7,9	74LS90	4	7
8	74LS32	4	7
5	3[illegible]	8	4
3	[illegible]	8	4
2	CA3130	8	4
4	TL082	8	4

5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN µH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN µF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

NOTE:

Figure 6-37. 35000 Reference Frequency Divider/SINAD.

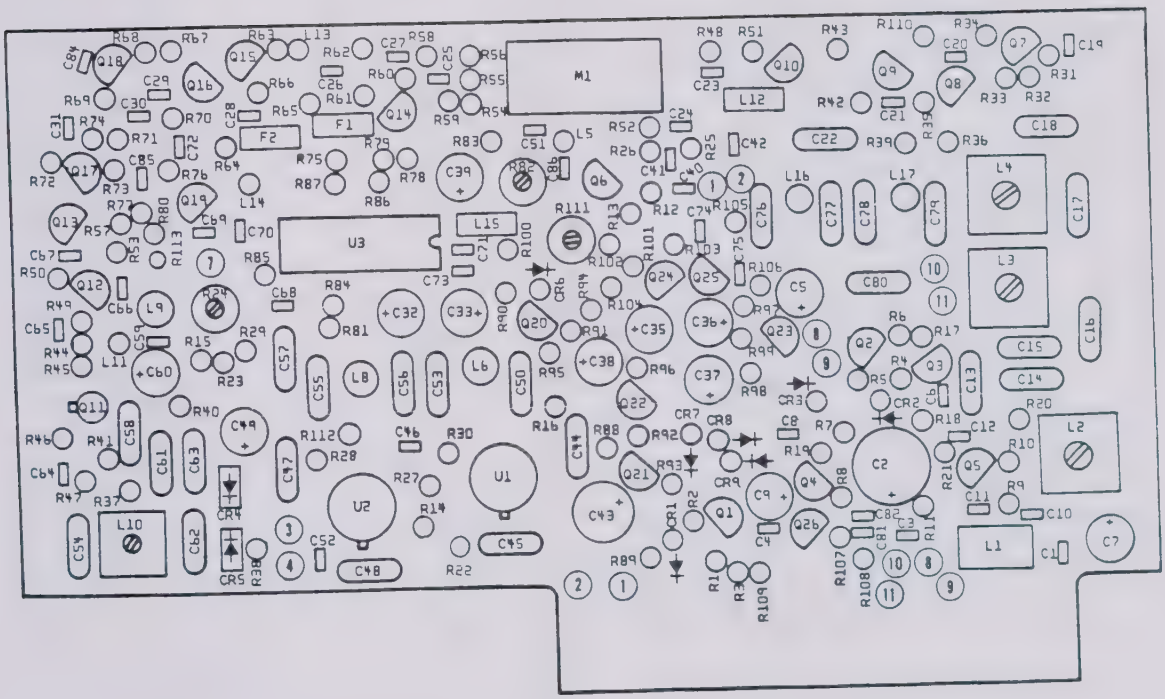


Figure 6-38. 36000 FM/AM Modulation, Component Location.

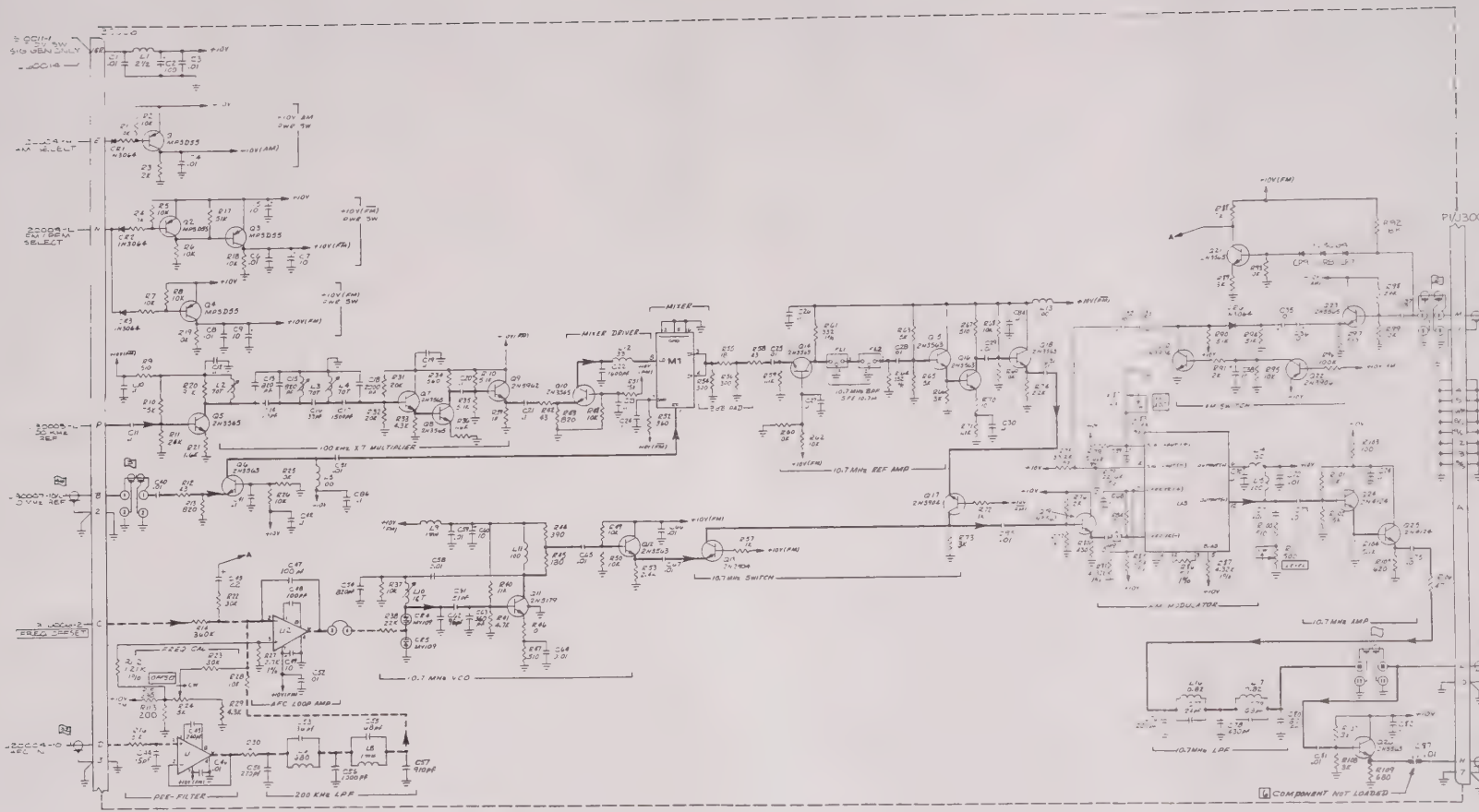
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
36000	PCB ASSY - FM/AM MODULATION	7001-0732	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-1030	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 10	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 11	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 12	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 13	CAP-820PF 5% 300V DIP MICA	1002-0039	ELMENCO	DM15-F-821J
C 14	CAP-18PF 5% 500V DIP MICA	1002-0014	ELMENCO	DM15-C-180J
C 15	CAP-820PF 5% 300V DIP MICA	1002-0039	ELMENCO	DM15-F-821J
C 16	CAP-33PF 5% 500V DIP MICA	1002-0024	ELMENCO	DM15-E-220J
C 17	CAP-1500PF 5% 500V DIP MICA	1002-0083	ELMENCO	DM19-E-152J
C 18	CAP-2000PF 5% 500V DIP MICA	1002-0077	ELMENCO	DM-19-E-202J
C 19	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 20	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 21	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 22	CAP-1600PF 5% 500V DIP MICA	1002-0072	ELMENCO	DM19-F-162J
C 23	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 24	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 25	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 26	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 27	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 28	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 29	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 30	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 31	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 32	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 33	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 35	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 36	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 37	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 38	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 39	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 40	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 41	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 42	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 43	CAP-22UF 10% 15V AXL TANT	1011-0003	SPRAGUE	150D226X9015B2
C 44	CAP-15PF 5% 500V DIP MICA	1002-0001	ELMENCO	DM15-C-150J
C 45	CAP-240PF 5% 500V DIP MICA	1002-0030	ELMENCO	DM15-F-241J
C 46	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 47	CAP-100PF 5% 500V DIP MICA	1002-0011	ELMENCO	DM15-F-101J
C 48	CAP-100PF 5% 500V DIP MICA	1002-0011	ELMENCO	DM15-F-101J
C 49	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 50	CAP-270PF 5% 500V DIP MICA	1002-0031	ELMENCO	DM15-F-2715
C 51	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 52	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 53	CAP-36PF 5% 500V DIP MICA	1002-0041	ELMENCO	DM15-E-360J

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C 54	CAP-820PF 5% 300V DIP MICA	1002-0039	ELMENCO	DM15-F-821J
C 55	CAP-68PF 5% 500V DIP MICA	1002-0013	ELMENCO	DM15-E-680J
C 56	CAP-1000PF 5% 100V DIP MICA	1002-0015	ELMENCO	DM15-F-102J
C 57	CAP-910PF 5% 100V DIP MICA	1002-0062	ELMENCO	DM15-F-911J
C 58	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 59	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 60	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 61	CAP-51PF 5% 500V DIP MICA	1002-0045	ELMENCO	DM15-E-510J
C 62	CAP-96PF 1% 500V DIP MICA	1002-0049	ELMENCO	DM15-F-960F
C 63	CAP-360PF 5% 500V DIP MICA	1002-0040	ELMENCO	DM15-F-361J
C 64	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 65	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 66	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 67	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 68	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 69	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 70	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 71	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 72	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 73	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 74	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 75	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 76	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 77	CAP-24PF 5% 500V DIP MICA	1002-0051	ELMENCO	DM15-C-240J
C 78	CAP-430PF 5% 500V DIP MICA	1002-0034		
C 79	CAP-68PF 5% 500V DIP MICA	1002-0013	ELMENCO	DM15-E-680J
C 80	CAP-180PF 5% 500V DIP MICA	1002-0005	ELMENCO	DM15-F-181J
C 81	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 82	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 84	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 85	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 86	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
CR 5	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	FILTER			
FL 1	FLTR-CER 10.7 MHZ 3DB BW 280 KHZ	1040-0043	MURATA CORP.	10.70MHZ RED ONLY
FL 2	FLTR-CER 10.7 MHZ 3DB BW 280 KHZ	1040-0043	MURATA CORP.	10.70MHZ RED ONLY
	INDUCTOR			
L 1	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 2	COIL-VAR IF L45-1/5/44 LITZ/70T	1596-0290		
L 3	COIL-VAR IF L45-1/5/44 LITZ/70T	1596-0290		
L 4	COIL-VAR IF L45-1/5/44 LITZ/70T	1596-0290		
L 5	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 6	CH-680UH 5% RF MLD AXL .19DX.44L	1585-0023	DELEVAN	2500-20
L 8	CH-1000UH 5% RF MLD AXL .19DX.44L	1585-0020	DELEVAN	2500-28

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
L 9	CH-1000UH 5% RF MLD AXL .19DX.44L	1585-0020	DELEVAN	2500-28
L 10	COIL-VAR IF L31-6/30GA/16T	1596-0292		
L 11	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 12	CH-33UH 10% RF MLD AXL .10DX.25L	1585-0071	DELEVAN	1025-56
L 13	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 14	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 15	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 16	CH-.82UH 10% RF MLD AXL .16DX.38L	1585-0061	DELEVAN	1537-10
L 17	CH-.82UH 10% RF MLD AXL .16DX.38L	1585-0061	DELEVAN	1537-10
	MIXER			
M 1	MXR-SBL-1 DBL BAL 1-500MHZ	2010-0009	MINI-CIRCUITS LAB	SBL-1
	TRANSISTOR			
Q 1	XSTR-MPSD55 PNP SI T092 LOW PWR	1272-0092	MOTOROLA	MPS-D55
Q 2	XSTR-MPSD55 PNP SI T092 LOW PWR	1272-0092	MOTOROLA	MPS-D55
Q 3	XSTR-MPSD55 PNP SI T092 LOW PWR	1272-0092	MOTOROLA	MPS-D55
Q 4	XSTR-MPSD55 PNP SI T092 LOW PWR	1272-0092	MOTOROLA	MPS-D55
Q 5	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 6	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 7	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 8	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 9	XSTR-2N5962 NPN SI T092 LOW PWR	1272-0059	FAIRCHILD	2N5962
Q 10	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 11	XSTR-2N5179 NPN SI T072 LOW PWR (MOTA)	1272-0060	MOTOROLA	2N5179
Q 12	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 13	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 14	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 15	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 16	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 17	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 18	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 19	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 20	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 21	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 22	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 23	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 24	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 25	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 26	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
	RESISTOR			
R 1	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 2	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 3	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 4	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 5	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 6	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 7	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 8	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 9	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 10	RES-75K 5% 1/4W CC	1066-7535	ALLEN BRADLEY	CB 7535
R 11	RES-24K 5% 1/4W CC	1066-2435	ALLEN BRADLEY	CB2435
R 12	RES-43 OHM 5% 1/4W CC	1066-4305	ALLEN BRADLEY	CB 4305
R 13	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 14	RES-360K 5% 1/4W CC	1066-3645	ALLEN BRADLEY	CB3645
R 15	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 16	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 17	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 18	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 19	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 20	RES-9.1K 5% 1/4W CC	1066-9125	ALLEN BRADLEY	CB 9125
R 21	RES-1.6K 5% 1/4W CC	1066-1625	ALLEN BRADLEY	CB1625
R 22	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 23	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 24	POT-5K 10% 1/2W 1T CERMET TRMR	1215-0053	ALLEN BRADLEY	A2A502
R 25	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 26	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 27	RES-2.74K 1% 100PPM FILM	1075-0071	CAT.LIST	55-025
R 28	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 29	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 30	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 31	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 32	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 33	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 34	RES-560 OHM 5% 1/4W CC	1066-5615	ALLEN BRADLEY	CB 5615
R 35	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 36	RES-1.6K 5% 1/4W CC	1066-1625	ALLEN BRADLEY	CB1625
R 37	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 38	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 39	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 40	RES-11K 5% 1/4W CC	1066-1135	ALLEN BRADLEY	CB1135
R 41	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 42	RES-43 OHM 5% 1/4W CC	1066-4305	ALLEN BRADLEY	CB 4305
R 43	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215
R 44	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 45	RES-180 OHM 5% 1/4W CC	1066-1815	ALLEN BRADLEY	CB1815
R 46	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 47	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 48	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 49	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 50	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 51	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 52	RES-360 OHM 5% 1/4W CC	1066-3615	ALLEN BRADLEY	CB3615
R 53	RES-2.4K 5% 1/4W CC	1066-2425	ALLEN BRADLEY	CB2425
R 54	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 55	RES-18 OHM 5% 1/4W CC	1066-1805	ALLEN BRADLEY	CB1805
R 56	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 57	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 58	RES-43 OHM 5% 1/4W CC	1066-4305	ALLEN BRADLEY	CB 4305
R 59	RES-1.1K 5% 1/4W CC	1066-1125	ALLEN BRADLEY	CB1125
R 60	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 61	RES-332 OHM 1% 100PPM FILM	1075-0024	CAT.LIST	55-100
R 62	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 63	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 64	RES-332 OHM 1% 100PPM FILM	1075-0024	CAT.LIST	55-100
R 65	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 66	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 67	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 68	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB [illegible]
R 69	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 70	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005

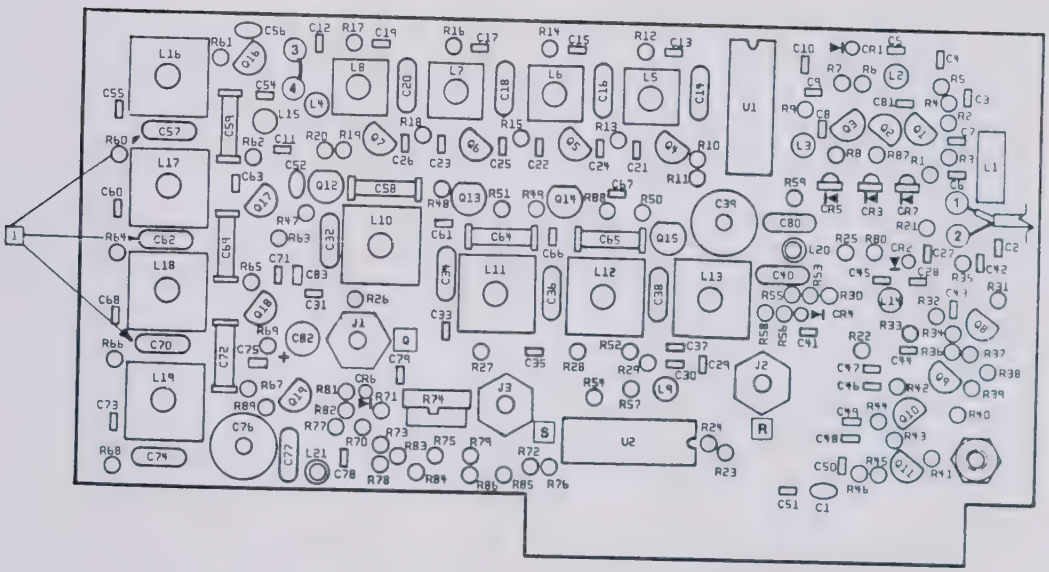
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 71	RES-1.1K 5% 1/4W CC	1066-1125	ALLEN BRADLEY	CB1125
R 72	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 73	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 74	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 75	RES-33.2K 1% 100PPM FILM	1075-0098	CAT.LIST	55-100
R 76	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 77	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 78	RES-5.62K 1% 100PPM FILM	1075-0013	CAT.LIST	55-100
R 79	RES-22.6K 1% 100PPM FILM	1074-1056	CAT.LIST	55-100
R 80	RES-430 OHM 5% 1/4W CC	1066-4315	ALLEN BRADLEY	CB 4315
R 81	RES-4.32K 1% 100PPM FILM	1075-0111	CAT.LIST	55-100
R 82	POT-2K 10% 1/2W 1T CERMET TRMR	1215-0057	ALLEN BRADLEY	A2A202
R 83	RES-3.74K 1% 150PPM FILM	1074-1017	CAT.LIST	55-100
R 84	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 85	RES-1.5K 1% 100PPM FILM	1075-0039	CAT.LIST	55-100
R 86	RES-511 OHM 1% 150 PPM FILM	1074-1008	CAT.LIST	55-100
R 87	RES-4.32K 1% 100PPM FILM	1075-0111	CAT.LIST	55-100
R 88	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 89	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 90	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 91	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 92	RES-18K 5% 1/4W CC	1066-1835	ALLEN BRADLEY	CB1835
R 93	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 94	RES-51K 5% 1/4W CC	1066-5135	ALLEN BRADLEY	CB 5135
R 95	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 96	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 97	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 98	RES-24K 5% 1/4W CC	1066-2435	ALLEN BRADLEY	CB2435
R 99	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 100	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 101	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 102	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 103	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 104	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 105	RES-620 OHM 5% 1/4W CC	1066-6215	ALLEN BRADLEY	CB 6215
R 106	RES-47 OHM 5% 1/4W CC	1066-4705	ALLEN BRADLEY	CB 4705
R 107	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 108	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 109	RES-680 OHM 5% 1/4W CC	1066-6815	ALLEN BRADLEY	CB 6815
R 110	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 111	POT-500 OHM 10% 1/2W 1T CERMET TRMR	1215-0051	ALLEN BRADLEY	A2A501
R 112	RES-1.21K 1% 100PPM FILM	1075-0042	CAT.LIST	55-100
R 113	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
	INTEGRATED CIRCUIT			
U 1	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 2	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 3	IC-1496 14 PIN DIP	2025-0197	MOTOROLA	MC1496P



REF DES NOT USED: C34, C83, L7

NOTE
6. CBT INSTALLED & REMOVED DURING BOARD TEST.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *REACTOR SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-39. 36000 FM/AM Modulation.



1. FACTORY SELECT VALUE

Figure 6-40. 37000 Reference Frequency Generator, Component Location.

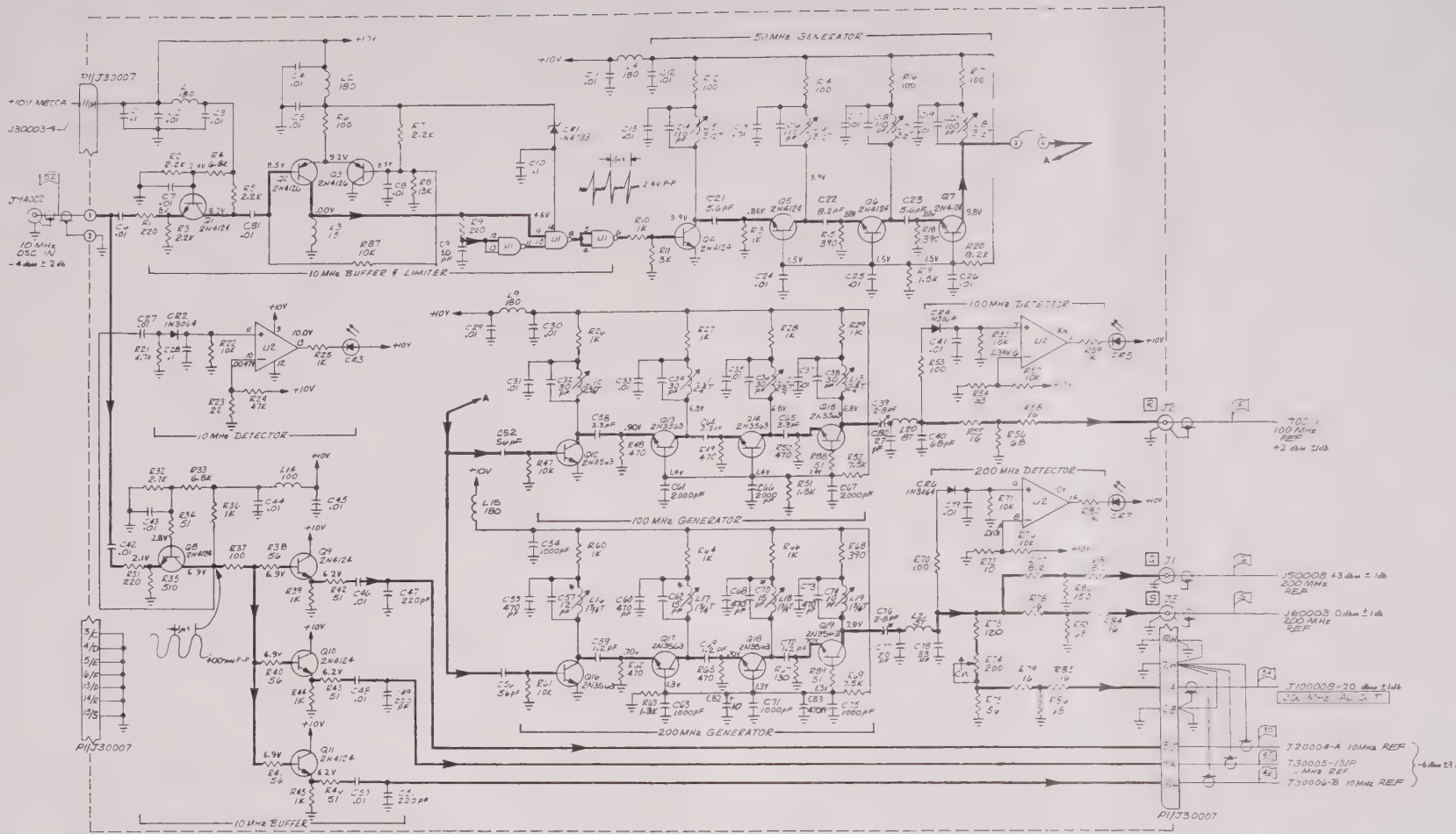
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
37000	PCB ASSY - REF. FREQ. GENERATOR	7001-0593	CUSHMAN	CE-50A-1/TG*
	PRINTED CIRCUIT BOARD	1780-1071	CUSHMAN	*(AND CE-46A)
	CAPACITOR			
C 1	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 2	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-10PF 10% 100V NPO MINTR CER	1005-0074	TUSONIX	8101-100-C0G0-100K
C 10	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-110PF 5% 500V DIP MICA	1002-0026	ELMENCO	DM15-F-111J
C 15	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 16	CAP-110PF 5% 500V DIP MICA	1002-0026	ELMENCO	DM15-F-111J
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-110PF 5% 500V DIP MICA	1002-0026	ELMENCO	DM15-F-111J
C 19	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 20	CAP-100PF 5% 500V DIP MICA	1002-0011	ELMENCO	DM15-F-101J
C 21	CAP-5.6PF 10% 100V NPO MINTR CER	1005-0111	TUSONIX	8101-100-C0G0-569D
C 22	CAP-5.6PF 10% 100V NPO MINTR CER	1005-0111	TUSONIX	8101-100-C0G0-569D
C 23	CAP-8.2PF +/-.5PF 100V NPO MINI CER	1005-0104	TUSONIX	8101-100 C0H0 829D
C 24	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 25	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 26	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 27	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 28	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 29	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 30	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 31	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 32	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 33	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 34	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 35	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 36	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 37	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 38	CAP-24PF 5% 500V DIP MICA	1002-0051	ELMENCO	DM15-C-240J
C 39	CAP-2-8PF 350V NPO V MT CER TRMR	1001-0004	TUSONIX	538-011A2-8
C 40	CAP-68PF 5% 500V DIP MICA	1004-0014	SANGAMO	D105E680
C 41	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 42	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 43	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 44	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 45	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 46	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 47	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRR0-221K
C 48	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 49	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRR0-221K
C 50	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 51	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRR0-221K
C 52	CAP-56PF 10% 100V NPO MINTR CER	1005-0109	TUSONIX	8121-100-C0G0-560K
C 54	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C 55	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 56	CAP-56PF 10% 100V NPO MINTR CER	1005-0109	TUSONIX	8121-100-C0G0-560K
C 57	CAP-12PF 5% 500V DIP MICA	1002-0017	ELMENCO	DM15-C-120J
C 58	CAP-3.3PF .25PF 500V NPO CER TUB	1005-0011	TUSONIX	301-00-C0J0-339C
C 59	CAP-1.2PF .1PF 500V NPO CER TUB	1005-0016	TUSONIX	301-000-C0K0-129B
C 60	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 61	CAP-2000PF 5% 100V NPO MINTR CER	1005-0129	CENTRE	200-100-NPO-202J
C 62	CAP-15PF 5% 500V DIP MICA	1002-0001	ELMENCO	DM15-C-150J
C 63	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 64	CAP-3.3PF .25PF 500V NPO CER TUB	1005-0011	TUSONIX	301-00-C0J0-339C
C 65	CAP-3.3PF .25PF 500V NPO CER TUB	1005-0011	TUSONIX	301-00-C0J0-339C
C 66	CAP-2000PF 5% 100V NPO MINTR CER	1005-0129	CENTRE	200-100-NPO-202J
C 67	CAP-2000PF 5% 100V NPO MINTR CER	1005-0129	CENTRE	200-100-NPO-202J
C 68	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 69	CAP-1.2PF .1PF 500V NPO CER TUB	1005-0016	TUSONIX	301-000-C0K0-129B
C 70	CAP-15PF 5% 500V DIP MICA	1002-0001	ELMENCO	DM15-C-150J
C 71	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 72	CAP-1.2PF .1PF 500V NPO CER TUB	1005-0016	TUSONIX	301-000-C0K0-129B
C 73	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 74	CAP-10PF 5% 500V DIP MICA	1002-0016	ELMENCO	DM15-C-100J
C 75	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 76	CAP-2-8PF 350V NPO V MT CER TRMR	1001-0004	TUSONIX	538-011A2-8
C 77	CAP-20PF 5% 500V DIP MICA	1004-0008	CORNELL DUBILIER	CD10ED200J
C 78	CAP-33PF 5% 500V THIN DIP MICA	1004-0006	CORNELL DUBILIER	CD6ED330J
C 79	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 80	CAP-27PF 5% 500V DIP MICA	1004-0009	CORNELL DUBILIER	CD10ED270J
C 81	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 82	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 83	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
	DIODE			
CR 1	DIO-1N4733 SI ZENER A98A 5.1V 10% 1W	1281-0015	MOTOROLA	1N4733
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-LT EMIT RED 1.6V W ANG T1	1281-0137	HP	5082-4484
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-LT EMIT RED 1.6V W ANG T1	1281-0137	HP	5082-4484
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-LT EMIT RED 1.6V W ANG T1	1281-0137	HP	5082-4484
	CONNECTOR			
J 1	CONN-SMB 50 OHM STR JK PC MT SNAP-ON	2536-0071	SEALECTRO	51-051-0000
J 2	CONN-SMB 50 OHM STR JK PC MT SNAP-ON	2536-0071	SEALECTRO	51-051-0000
J 3	CONN-SMB 50 OHM STR JK PC MT SNAP-ON	2536-0071	SEALECTRO	51-051-0000
	INDUCTOR			
L 1	CH-180UH 5% RF MLD AXL .16DX.38L	1585-0035	DELEVAN	1537-88
L 2	CH-180UH 5% RF MLD AXL .16DX.38L	1585-0035	DELEVAN	1537-88
L 3	CH-15UH 10% RF MLD AXL .16DX.38L	1585-0034	DELEVAN	1537-40
L 4	CH-180UH 5% RF MLD AXL .16DX.38L	1585-0035	DELEVAN	1537-88
L 5	COIL ASSY-VARIABLE IF 3 1/2 TURN	1596-0238		
L 6	COIL ASSY-VARIABLE IF 3 1/2 TURN	1596-0238		
L 7	COIL ASSY-VARIABLE IF 3 1/2 TURN	1596-0238		
L 8	COIL ASSY-VARIABLE IF 3 1/2 TURN	1596-0238		
L 9	CH-180UH 10% RF MLD AXL .10DX.25L	1585-0077	DELEVAN	1025-74
L 10	COIL ASSY-VARIABLE	7050-0122		

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
L 11	COIL ASSY-VARIABLE	7050-0122		
L 12	COIL ASSY-VARIABLE	7050-0122		
L 13	COIL ASSY-VARIABLE	7050-0122		
L 14	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 15	CH-180UH 5% RF MLD AXL .16DX.38L	1585-0035	DELEVAN	1537-88
L 16	ASSY-COIL VARIABLE 1-3/4 TURN	1596-0051		
L 17	ASSY-COIL VARIABLE 1-3/4 TURN	1596-0051		
L 18	ASSY-COIL VARIABLE 1-3/4 TURN	1596-0051		
L 19	ASSY-COIL VARIABLE 1-3/4 TURN	1596-0051		
L 20	COIL-RES CORE .093 DIA/26GA/8T	1596-0306	CUSHMAN	C/E DWG & M/L
L 21	COIL-RES CORE .093 DIA/26GA/5T	1596-0305	CUSHMAN	C/E DWG M/L
	TRANSISTOR			
Q 1	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 2	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 3	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 4	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 5	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 6	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 7	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 8	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 9	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 10	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 11	XSTR-2N4124 NPN SI T092 LOW PWR	1272-0091	FAIRCHILD	2N4124
Q 12	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 13	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 14	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 15	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 16	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 17	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 18	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 19	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
	RESISTOR			
R 1	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 2	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 3	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 4	RES-6.8K 5% 1/4W CC	1066-6825	ALLEN BRADLEY	CB 6825
R 5	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 6	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 7	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 8	RES-13K 5% 1/4W CC	1066-1335	ALLEN BRADLEY	CB1335
R 9	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 10	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 11	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 12	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 13	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 14	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 15	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 16	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 17	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 18	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 19	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 20	RES-8.2K 5% 1/4W CC	1066-8225	ALLEN BRADLEY	CB 8225
R 21	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 22	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 23	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 24	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 25	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 26	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 27	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 28	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 29	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 30	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 31	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 32	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 33	RES-6.8K 5% 1/4W CC	1066-6825	ALLEN BRADLEY	CB 6825
R 34	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 35	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 36	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 37	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 38	RES-56 OHM 5% 1/4W CC	1066-5605	ALLEN BRADLEY	CB 5605
R 39	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 40	RES-56 OHM 5% 1/4W CC	1066-5605	ALLEN BRADLEY	CB 5605
R 41	RES-56 OHM 5% 1/4W CC	1066-5605	ALLEN BRADLEY	CB 5605
R 42	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 43	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 44	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 45	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 46	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 47	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 48	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 49	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 50	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 51	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 52	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 53	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 54	RES-33 OHM 5% 1/4W CC	1066-3305	ALLEN BRADLEY	CB3305
R 55	RES-16 OHM 5% 1/4W CC	1066-1605	ALLEN BRADLEY	CB1605
R 56	RES-68 OHM 5% 1/4W CC	1066-6805	ALLEN BRADLEY	CB 6805
R 57	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 58	RES-16 OHM 5% 1/4W CC	1066-1605	ALLEN BRADLEY	CB1605
R 59	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 60	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 61	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 62	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 63	RES-1.3K 5% 1/4W CC	1066-1325	ALLEN BRADLEY	CB1325
R 64	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 65	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 66	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 67	RES-130 OHM 5% 1/4W CC	1066-1315	ALLEN BRADLEY	CB1315
R 68	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 69	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 70	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 71	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 72	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 73	RES-120 OHM 5% 1/4W CC	1066-1215	ALLEN BRADLEY	CB1215
R 74	POT-200 OHM 20% 1/2W 1T CERMET TRMR	1215-0055	BECKMAN	91AR200
R 75	RES-56 OHM 5% 1/4W CC	1066-5605	ALLEN BRADLEY	CB 5605
R 76	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 77	RES-8.2 OHM 5% 1/4W CC	1066-0005	ALLEN BRADLEY	CB82G5
R 78	RES-16 OHM 5% 1/4W CC	1066-1605	ALLEN BRADLEY	CB1605
R 79	RES-16 OHM 5% 1/4W CC	1066-1605	ALLEN BRADLEY	CB1605
R 80	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 81	RES-8.2 OHM 5% 1/4W CC	1066-0005	ALLEN BRADLEY	CB82G5
R 82	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 83	RES-68 OHM 5% 1/4W CC	1066-6805	ALLEN BRADLEY	CB 6805
R 84	RES-16 OHM 5% 1/4W CC	1066-1605	ALLEN BRADLEY	CB1605
R 85	RES-16 OHM 5% 1/4W CC	1066-1605	ALLEN BRADLEY	CB1605
R 86	RES-68 OHM 5% 1/4W CC	1066-6805	ALLEN BRADLEY	CB 6805
R 87	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 88	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 89	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
	INTEGRATED CIRCUIT			
U 1	IC-SN7400N TTL NAND GATES	2025-0003	TI	SN7400N
U 2	IC-339 14 PIN DIP QUAD VOLTAGE COMPTR	2025-0201	MOTOROLA	MLM339P



NOTE

1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC ± 10% UNLESS OTHERWISE NOTED.
6. ALL VOLTAGES MEASURED WITH A 10 MΩ DVM.
7. ALL dB REFERENCED AC VOLTAGES MEASURED INTO 50 OHMS WITH BOUNTON MODEL 372 RF MILLIVOLTMETER.
8. ALL PEAK TO PEAK REFERENCED AC VOLTAGES MEASURED WITH 10 MΩ 10 pf PROBE AND TEKTRONICS 475 SCOPE.

U NO	TYPE	VCC	GND
1	7400		
2	LM339		

C53 NOT USED

Figure 6-41. 37000 Reference Frequency Generator

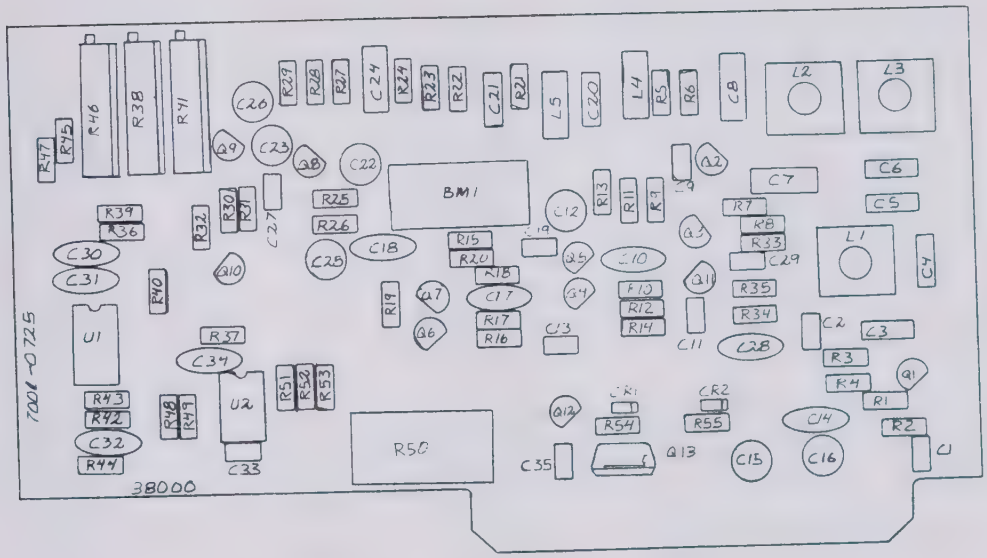
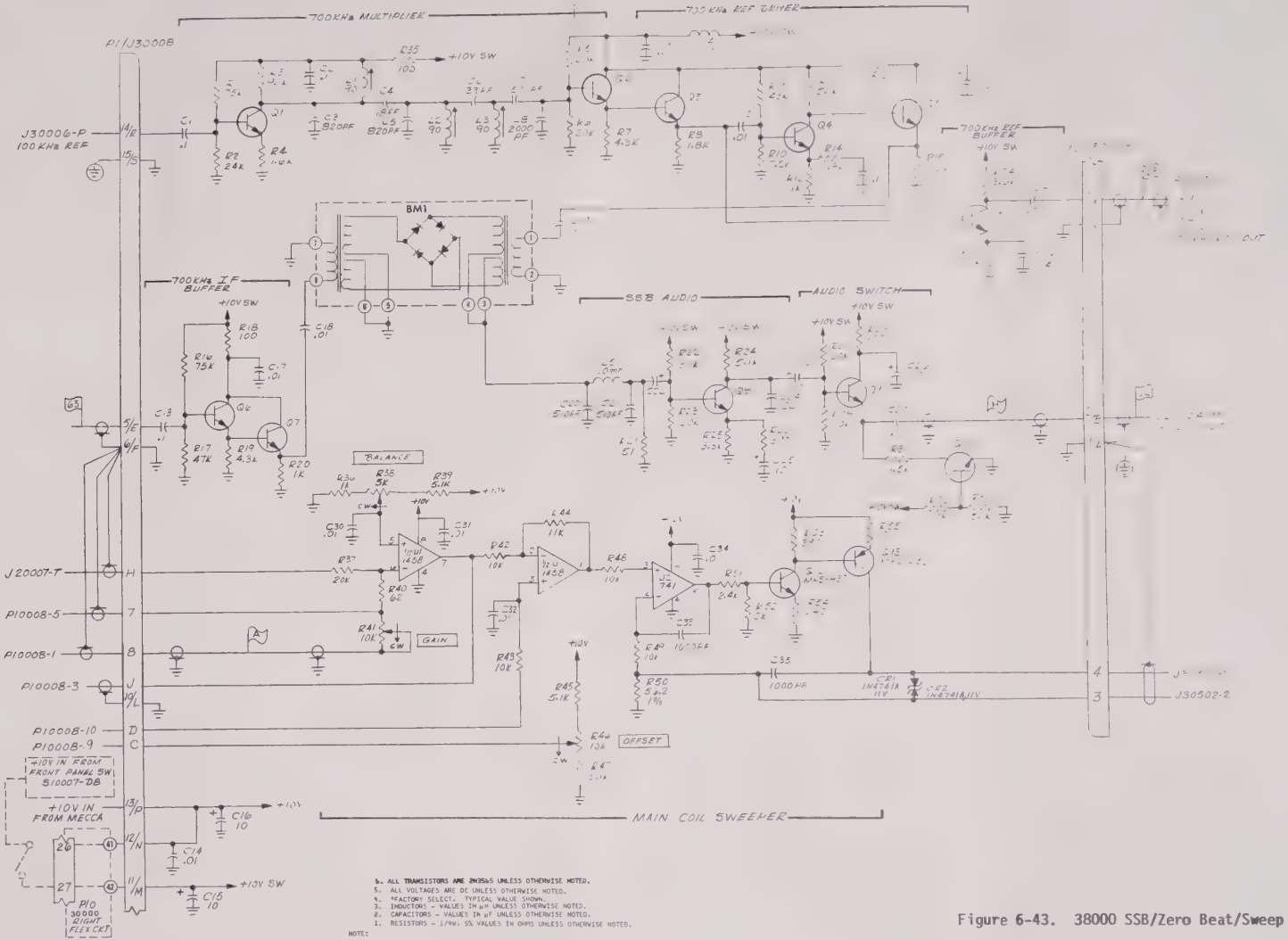


Figure 6-42. 38000 SSB/Zero Beat/Sweep Driver, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
38000	PCB ASSY - MAIN COIL SWEEP/SSB/ZB	7001-0725	CUSHMAN	CE-5110A ONLY
	PRINTED CIRCUIT BOARD	1780-0991	CUSHMAN	
	MIXER			
BM 1	MXR-SBL-1 DBL BAL 1-500MHZ	2010-0009	MINI-CIRCUITS LAB	SBL-1
	CAPACITOR			
C 1	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 2	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 3	CAP-820PF 5% 300V DIP MICA	1002-0039	ELMENCO	DM15-F-821J
C 4	CAP-18PF 5% 500V DIP MICA	1002-0014	ELMENCO	DM15-C-180J
C 5	CAP-820PF 5% 300V DIP MICA	1002-0039	ELMENCO	DM15-F-821J
C 6	CAP-33PF 5% 500V DIP MICA	1002-0024	ELMENCO	DM15-E-220J
C 7	CAP-1500PF 5% 500V DIP MICA	1002-0083	ELMENCO	DM19-E-152J
C 8	CAP-2000PF 5% 500V DIP MICA	1002-0077	ELMENCO	DM-19-E-202J
C 9	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 10	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 11	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 12	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 13	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 14	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 15	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 16	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 17	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 18	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 19	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 20	CAP-510PF 5% 500V DIP MICA	1002-0036	ELMENCO	DM15-F-511J
C 21	CAP-510PF 5% 500V DIP MICA	1002-0036	ELMENCO	DM15-F-511J
C 22	CAP-1UF -10+50% 50V RDL ELCTLT	1013-0047	PANASONIC	ECEA1HV010S
C 23	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 24	CAP-.22UF 10% 100V RDL MET-MYLAR	1008-0091	ELECTROCUBE	232A1B224K
C 25	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 26	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 27	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 28	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 29	CAP-.047UF 20% 100V V5W MINTR CER	1005-0096	ERIE	8121-100-651-473M
C 30	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 31	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 32	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 33	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 34	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 35	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
	DIODE			
CR 1	DIO-1N4741A SI ZENER A98A 11V 5% 1W	1281-0107	MOTOROLA	1N4741A
CR 2	DIO-1N4741A SI ZENER A98A 11V 5% 1W	1281-0107	MOTOROLA	1N4741A
	INDUCTOR			
L 1	COIL-VAR IF L45-1/5/44 LITZ/70T	1596-0290		
L 2	COIL-VAR IF L45-1/5/44 LITZ/70T	1596-0290		
L 3	COIL-VAR IF L45-1/5/44 LITZ/70T	1596-0290		
L 4	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 5	CH-10UH 10% RF MLD AXL .16DX.38L	1585-0016	DELEVAN	1537-36

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	TRANSISTOR			
Q 1	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 2	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 3	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 4	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 5	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 6	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 7	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 8	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 9	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 10	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 11	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 12	XSTR-MPS-H37 NPN SI T092 LOW PWR	1272-0073	MOTOROLA	MPS-H37
Q 13	XSTR-MPS-U55 PNP SI B18 HIGH PWR	1272-0074		
	RESISTOR			
R 1	RES-75K 5% 1/4W CC	1066-7535	ALLEN BRADLEY	CB 7535
R 2	RES-24K 5% 1/4W CC	1066-2435	ALLEN BRADLEY	CB2435
R 3	RES-9.1K 5% 1/4W CC	1066-9125	ALLEN BRADLEY	CB 9125
R 4	RES-1.6K 5% 1/4W CC	1066-1625	ALLEN BRADLEY	CB1625
R 5	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 6	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 7	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 8	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 9	RES-43K 5% 1/4W CC	1066-4335	ALLEN BRADLEY	CB 4335
R 10	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 11	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 12	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 13	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 14	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 15	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 16	RES-75K 5% 1/4W CC	1066-7535	ALLEN BRADLEY	CB 7535
R 17	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 18	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 19	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 20	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 21	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 22	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 23	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 24	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 25	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 26	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 27	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 28	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 29	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 30	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 31	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 32	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 33	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 34	RES-3.6K 5% 1/4W CC	1066-3625	ALLEN BRADLEY	CB3625
R 35	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 36	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 37	RES-20K 5% 1/4W CC	1066-2035	ALLEN BRADLEY	CB2035
R 38	POT-5K 10% 3/4W 15T CERMET TRMR	1215-0012	HELITRIM	89WR5K
R 39	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 40	RES-62 OHM 5% 1/4W CC	1066-6205	ALLEN BRADLEY	CB 6205

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 41	POT-10K 10% 3/4W 15T CERMET TRMR	1215-0014	HELITRIM	89WR10K
R 42	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 43	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 44	RES-11K 5% 1/4W CC	1066-1135	ALLEN BRADLEY	CB1135
R 45	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 46	POT-10K 10% 3/4W 15T CERMET TRMR	1215-0014	HELITRIM	89WR10K
R 47	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 48	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 49	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 50	RES-56.2 OHM 1% 1W 2PPM AXL WW	1157-0001	JORDAN	5-190+OR-2PPM 1%
R 51	RES-2.4K 5% 1/4W CC	1066-2425	ALLEN BRADLEY	CB2425
R 52	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 53	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 54	RES-240 OHM 5% 1/4W CC	1066-2415	ALLEN BRADLEY	CB2415
R 55	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
	INTEGRATED CIRCUIT			
U 1	IC-1458 DUAL OP AMP 8PIN DIP	2025-0058	RAYTHEON	RC1458NB
U 2	IC-UA741CP	2025-0067	TI	UA741CP



NOTE:

5. ALL TRANSISTORS ARE 2N3565 UNLESS OTHERWISE NOTED.
4. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
3. *FACTORY SELECT. TYPICAL VALUE SHOWN.
2. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
1. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-43. 38000 SSB/Zero Beat/Sweep Driver.

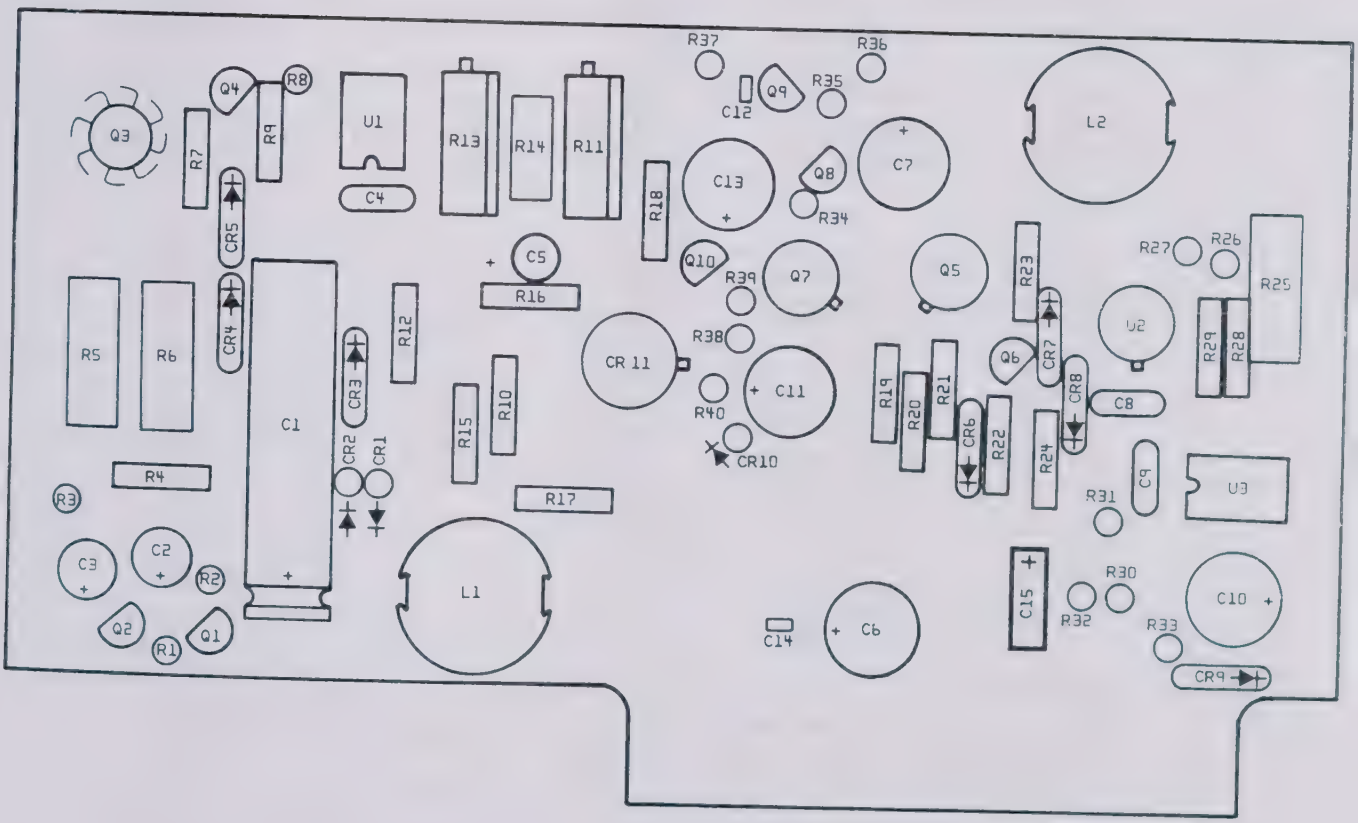
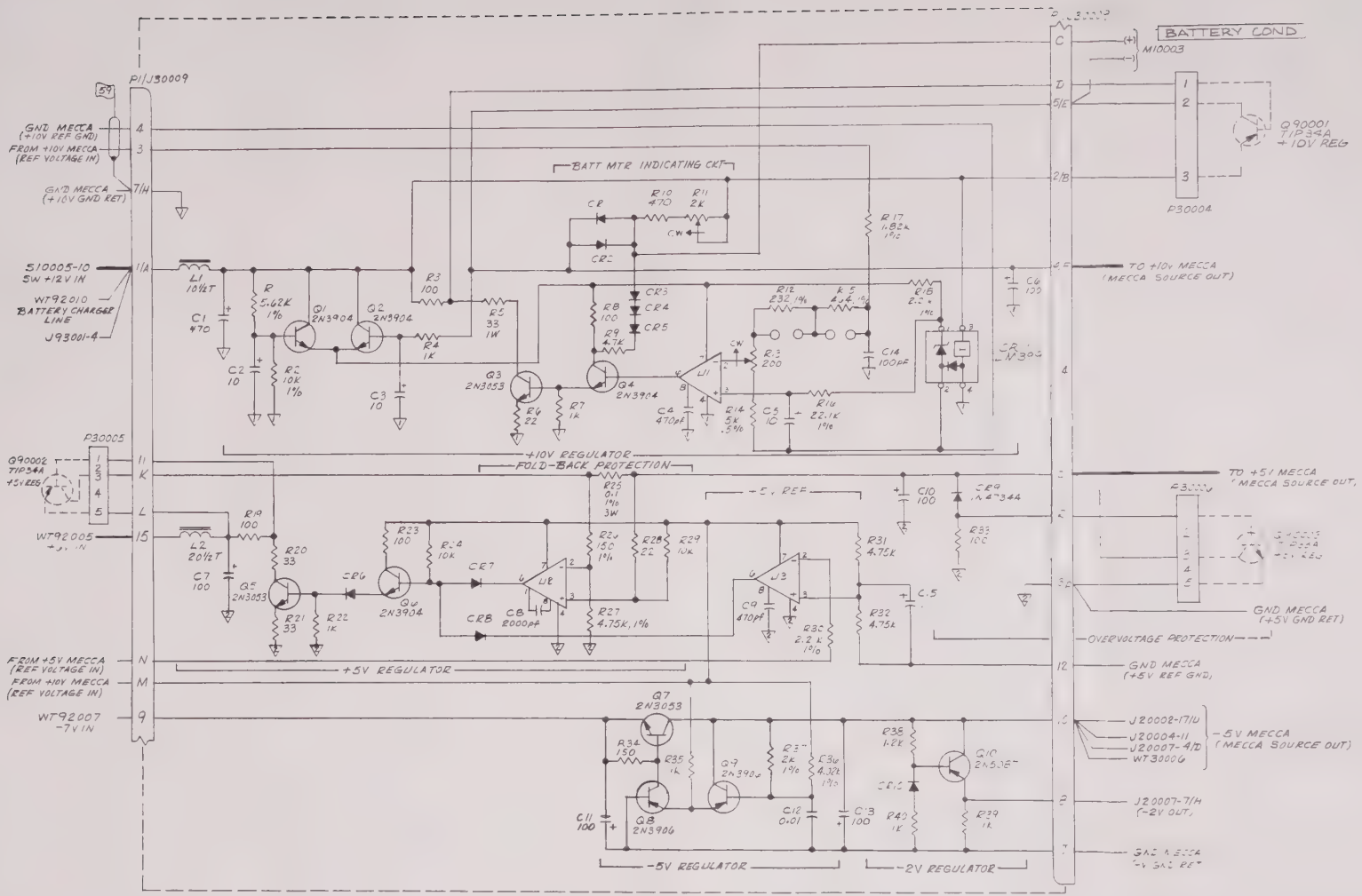


Figure 6-44 39000 10V/5V Regulators, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
39000	PCB ASSY - 10V/5V REGULATORS	7001-0502	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1043	CUSHMAN	
	CAPACITOR			
C 1	CAP-470UF +50-10% 25V AXL ELCTLT	1014-0020	ILL. CAP.	477TTA025A
C 2	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 3	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 4	CAP-470PF 5% 500V DIP MICA	1002-0035	SANGAMO	D155F471
C 5	CAP-10UF 20% 35V RDL ELCTLT	1013-0044	NICHICON	35UKB10M
C 6	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 7	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 8	CAP-.002UF 20% 500V Z5U CER DISC	1005-0003	TUSONIX	831-596-Z5U-202M
C 9	CAP-470PF 5% 500V DIP MICA	1002-0035	SANGAMO	D155F471
C 10	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 11	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 14	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 15	CAP-1UF+75-10% 50V ELCTLT	1013-0004	SPRAGUE	30D105G050BA5
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N4734A SI ZENER AIAY 5.6V 5% 1W	1281-0134	MOTOROLA	1N4734A
CR 10	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 11	DIO-399 ZENER TO46 MOD 6.95V 2PPM	1281-0133	NATIONAL	LM399H
	INDUCTOR			
L 1	INDCTR-POT CORE 18X11/10.5T/20GA	1596-0258		
L 2	INDCTR-POT CORE 18X11/20.5T/22GA	1596-0259		
	TRANSISTOR			
Q 1	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 2	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 3	XSTR-2N3053 NPN SI TO 5 HIGH PWR	1272-0011	RCA	2N3053
Q 4	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 5	XSTR-2N3053 NPN SI TO 5 HIGH PWR	1272-0011	RCA	2N3053
Q 6	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 7	XSTR-2N3053 NPN SI TO 5 HIGH PWR	1272-0011	RCA	2N3053
Q 8	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 9	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 10	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
	RESISTOR			
R 1	RES-5.62K 1% 100PPM FILM	1075-0013	CAT.LIST	55-100
R 2	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 3	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 4	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 5	RES-33 OHM 5% 1W CC	1068-3305	ALLEN BRADLEY	GB 3305

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 6	RES-22 OHM 5% 1W CC	1068-2205	ALLEN BRADLEY	GB 2205
R 7	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 8	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 9	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 10	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 11	POT-2K 10% 3/4W 15T CERMET TRMR	1215-0015	BECKMAN	89WR2K
R 12	RES-232 OHM 1% 25PPM FILM	1075-0173	SHELLY	RN55E
R 13	POT-200 OHM 10% 3/4W 15T CERMET TRMR	1215-0017	HELITRIM	89WR
R 14	RES-5K.5%.15W 15 PPM AXL WW	1177-0011	JORDAN	J110
R 15	RES-464 OHM 1% 25PPM FILM	1075-0174	SHELLY	RN55E
R 16	RES-22.1K 1% 100PPM FILM	1075-0012	CAT.LIST	55-100
R 17	RES-1.82K 1% 25PPM FILM	1075-0080	CAT.LIST	55-025
R 18	RES-2.21K 1% 100PPM FILM	1075-0010	CAT.LIST	55-100
R 19	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 20	RES-33 OHM 5% 1/4W CC	1066-3305	ALLEN BRADLEY	CB3305
R 21	RES-33 OHM 5% 1/4W CC	1066-3305	ALLEN BRADLEY	CB3305
R 22	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 23	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 24	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 25	RES-.10 OHM 3% 3W 90PPM AXL WW	1159-0010	DALE	RS-2B
R 26	RES-150 OHM 1% 100PPM FILM	1075-0125	CAT. LIST	55-100
R 27	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 28	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
R 29	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 30	RES-2.21K 1% 100PPM FILM	1075-0010	CAT.LIST	55-100
R 31	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 32	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 33	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 34	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 35	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 36	RES-4.02K 1% 100PPM FILM	1075-0094	CAT.LIST	55-100
R 37	RES-2K 1% 100PPM FILM	1075-0103	CAT.LIST	55-100
R 38	RES-1.2K 5% 1/4W CC	1066-1225	ALLEN BRADLEY	CB1225
R 39	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 40	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
	INTEGRATED CIRCUIT			
U 1	IC-LM308N OP AMPL 8 PIN	2025-0070	NATIONAL	LM308N
U 2	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 3	IC-LM308N OP AMPL 8 PIN	2025-0070	NATIONAL	LM308N



NOTE
6. ALL DIODES ARE IN3064 UNLESS OTHERWISE NOTED.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN mH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-45. 39000 10V/5V Regulators.

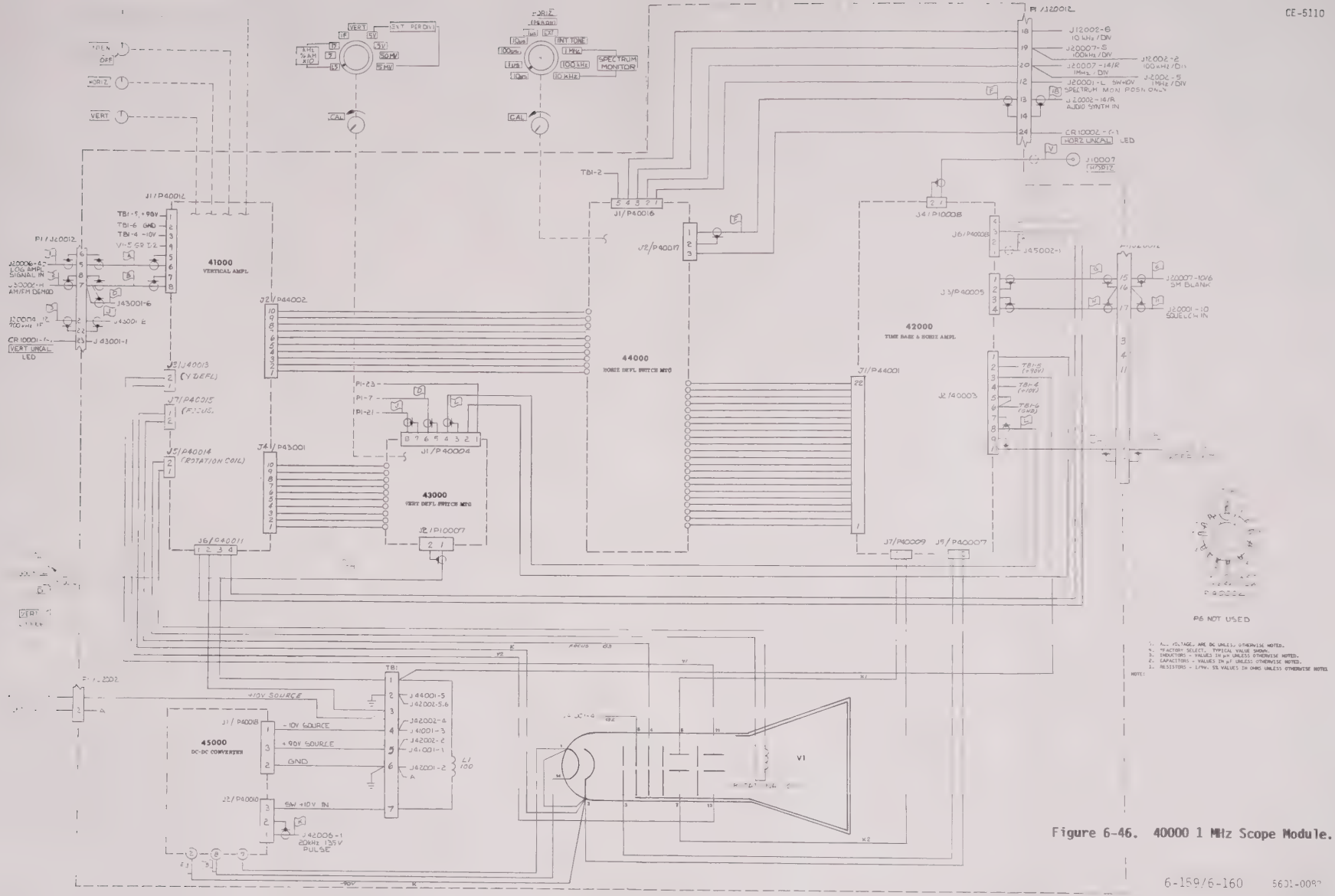


Figure 6-46. 40000 1 MHz Scope Module.

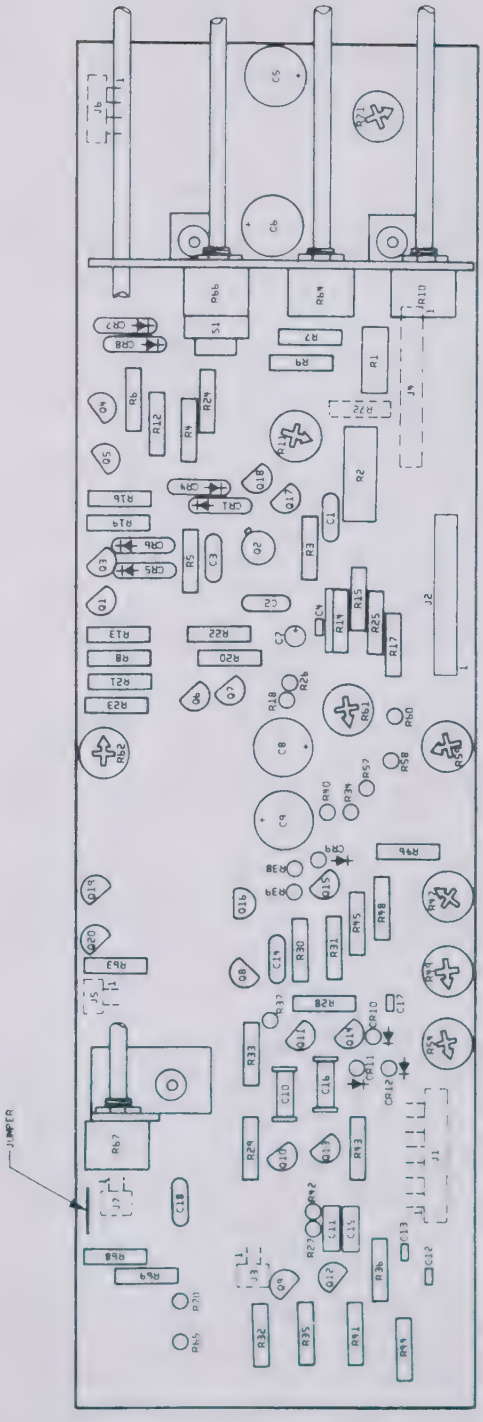
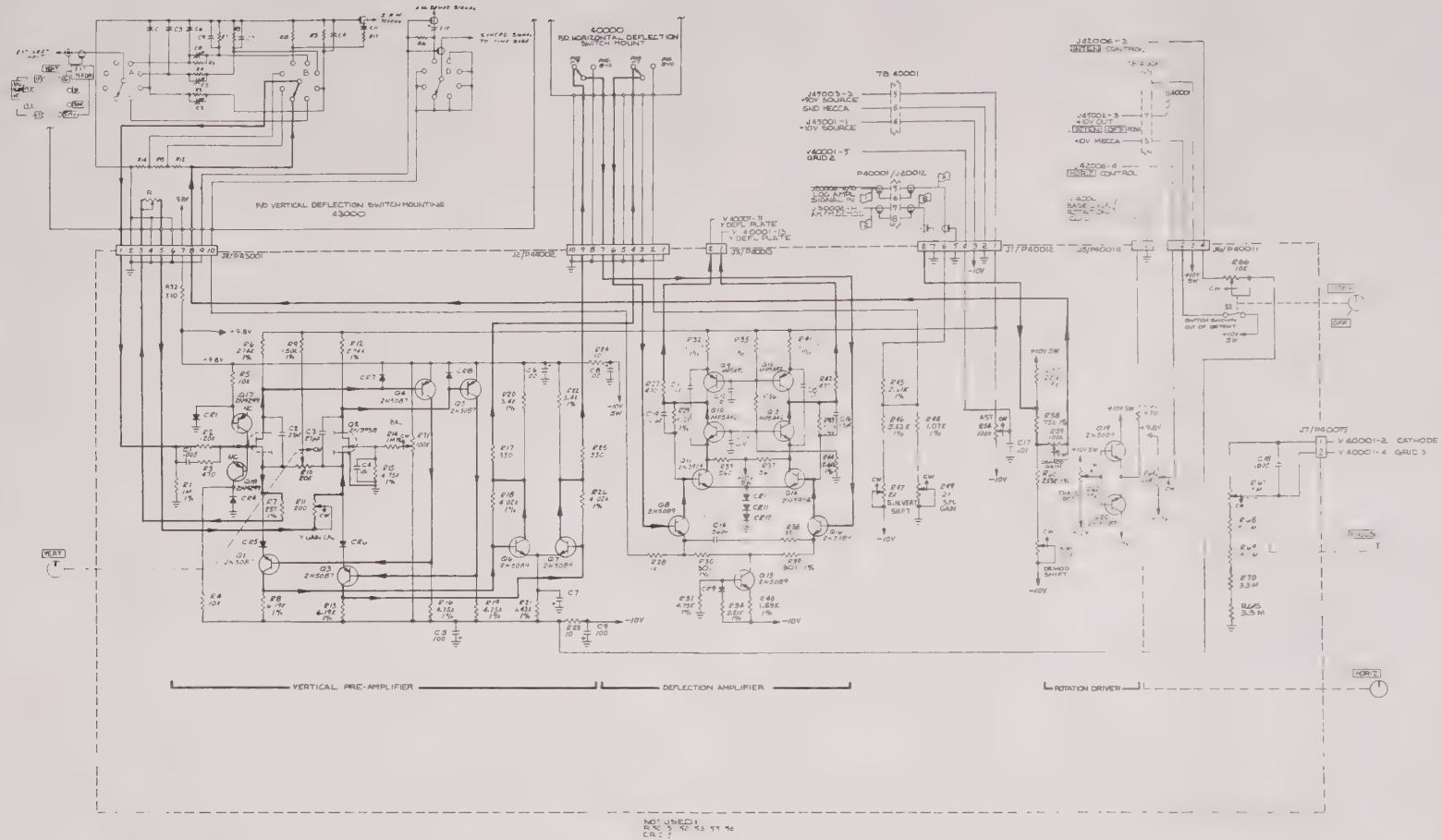


Figure 6-47 41000 Vertical Amplifier, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
41000	PCB ASSY - VERT. AMP.	7001-0614	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1014	CUSHMAN	
	CAPACITOR			
C 1	CAP-.005UF GMV 1KV Z5U CER DISC	1005-0009	CENTRALAB	DD-502
C 2	CAP-27PF 5% 500V DIP MICA	1002-0008	ELMENCO	DM15-E-270J
C 3	CAP-27PF 5% 500V DIP MICA	1002-0008	ELMENCO	DM15-E-270J
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 6	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 7	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 8	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 9	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 10	CAP-1.5PF .25PF 500V NPO CER TUB	1005-0041	TUSONIX	301-000-C0K0-159C
C 11	CAP-.1UF 10% 100V MLD CER	1005-0064	AEROVOX	CK06BX104K
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-56PF 5% 500V DIP MICA	1002-0019	ELMENCO	DM15-E-560J
C 15	CAP-.1UF 10% 100V MLD CER	1005-0064	AEROVOX	CK06BX104K
C 16	CAP-1.5PF .25PF 500V NPO CER TUB	1005-0041	TUSONIX	301-000-C0K0-159C
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-.005UF GMV 1KV Z5U CER DISC	1005-0009	CENTRALAB	DD-502
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 10	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 11	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 12	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	CONNECTOR			
J 1	CONN-8 PIN .1SP RTANG LKG PCB MT JK	2535-0178		
J 2	CONN-10PIN .1SP RTANG FLAT CA JK	2535-0185	BURNDY	HBRB10R-1
J 3	CONN-2 PIN .1SP RTANG LKG PCB MT JK	2535-0172	METHODE	1100-9-102-01
J 4	CONN-10PIN .1SP RTANG FLAT CA JK	2535-0185	BURNDY	HBRB10R-1
J 5	CONN-2 PIN .1SP RTANG LKG PCB MT JK	2535-0172	METHODE	1100-9-102-01
J 6	CONN-4 PIN .1SP RTANG LKG PCB MT JK	2535-0174	METHODE	1100-9-104-01
J 7	CONN-2 PIN .1SP RTANG LKG PCB MT JK	2535-0172	METHODE	1100-9-102-01
	TRANSISTOR			
Q 1	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 2	XSTR-2N3958 SI T071 DUAL J-FET N-CHAN	1272-0127	NATIONAL	2N3958
Q 3	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 4	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 5	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 6	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 7	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 8	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 9	XSTR-MPSA92 PNP SI T092 LOW PWR	1272-0088	MOTOROLA	MPSA92
Q 10	XSTR-MPSA42 NPN SI T092 LOW PWR	1272-0089	MOTOROLA	MPSA42

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
Q 11	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 12	XSTR-MPSA92 PNP SI T092 LOW PWR	1272-0088	MOTOROLA	MPSA92
Q 13	XSTR-MPSA42 NPN SI T092 LOW PWR	1272-0089	MOTOROLA	MPSA42
Q 14	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 15	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 16	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 17	XSTR-2N4249 PNP SI R124B LOW PWR	1272-0024	CARTER SEMI	2N4249
Q 18	XSTR-2N4249 PNP SI R124B LOW PWR	1272-0024	CARTER SEMI	2N4249
Q 19	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 20	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
	RESISTOR			
R 1	RES-1MEG 1% 150PPM FILM	1074-1039	CAT.LIST	55-100
R 2	RES-120K 5% 1W CC	1068-1245	ALLEN BRADLEY	GB 1245
R 3	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 4	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 5	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 6	RES-274K 1% 100PPM FILM	1075-0062		
R 7	RES-237 OHM 1% 150PPM FILM	1074-1041	CAT.LIST	55-100
R 8	RES-6.19K 1% 100PPM FILM	1075-0109	CAT.LIST	55-100
R 9	RES-150K 1% 100PPM FILM	1075-0152	CAT. LIST	55-100
R 10	POT-20K 10% 1/2W LIN 1/8SFT CC	1203-0095	ALLEN BRADLEY	WAZG056S203UA
R 11	POT-200 OHM 20% 1/2W 1T CERMET TRMR	1215-0055	BECKMAN	91AR200
R 12	RES-274K 1% 100PPM FILM	1075-0062		
R 13	RES-6.19K 1% 100PPM FILM	1075-0109	CAT.LIST	55-100
R 14	RES-1MEG 1% 150PPM FILM	1074-1039	CAT.LIST	55-100
R 15	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 16	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 17	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 18	RES-4.02K 1% 100PPM FILM	1075-0094	CAT.LIST	55-100
R 19	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 20	RES-3.4K 1% 100PPM FILM	1075-0020	CAT.LIST	55-100
R 21	RES-1.43K 1% 100PPM FILM	1075-0021	CAT.LIST	55-100
R 22	RES-3.4K 1% 100PPM FILM	1075-0020	CAT.LIST	55-100
R 23	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 24	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 25	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 26	RES-4.02K 1% 100PPM FILM	1075-0094	CAT.LIST	55-100
R 27	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 28	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 29	RES-43.2K 1% 100PPM FILM	1075-0117		
R 30	RES-301 OHM 1% 100PPM FILM	1075-0048	CAT.LIST	55-100
R 31	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 32	RES-2K 1% 100PPM FILM	1075-0103	CAT.LIST	55-100
R 33	RES-560 OHM 5% 1/4W CC	1066-5615	ALLEN BRADLEY	CB 5615
R 34	RES-2.21K 1% 100PPM FILM	1075-0010	CAT.LIST	55-100
R 35	RES-4.99K 1% 100PPM FILM	1075-0095	CAT.LIST	55-100
R 36	RES-36.5K 1% 100PPM FILM	1075-0113	CAT.LIST	55-100
R 37	RES-560 OHM 5% 1/4W CC	1066-5615	ALLEN BRADLEY	CB 5615
R 38	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 39	RES-301 OHM 1% 100PPM FILM	1075-0048	CAT.LIST	55-100
R 40	RES-1.69K 1% 150PPM FILM	1074-1015	CAT.LIST	55-100
R 41	RES-2K 1% 100PPM FILM	1075-0103	CAT.LIST	55-100
R 42	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 43	RES-43.2K 1% 100PPM FILM	1075-0117		
R 44	RES-2.61K 1% 100PPM FILM	1075-0090	CAT.LIST	55-100
R 45	RES-2.61K 1% 100PPM FILM	1075-0090	CAT.LIST	55-100

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 46	RES-5.62K 1% 100PPM FILM	1075-0013	CAT.LIST	55-100
R 47	POT-2K 20% 1/2W 1T CERMET TRMR	1203-0072	BECKMAN	91A-R2K
R 48	RES-1.07K 1% 100PPM FILM	1075-0166	CAT. LIST	55-100
R 49	POT-2K 20% 1/2W 1T CERMET TRMR	1203-0072	BECKMAN	91A-R2K
R 54	POT-100K 20% 1/2W 1T CERMET TRMR	1215-0046	BECKMAN	91AR100K
R 57	RES-221K 1% 100PPM FILM	1075-0040	CAT.LIST	55-100
R 58	RES-75K 1% 100PPM FILM	1075-0135	CAT. LIST	55-100
R 59	POT-100K 20% 1/2W 1T CERMET TRMR	1215-0046	BECKMAN	91AR100K
R 60	RES-255K 1% 100PPM FILM	1075-0017	CAT.LIST	55-100
R 61	POT-100K 20% 1/2W 1T CERMET TRMR	1215-0046	BECKMAN	91AR100K
R 62	POT-25K 20% 1/2W 1T CERMET TRMR	1215-0045	BECKMAN	91AR25K
R 63	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 64	POT-20K 10% 1/2W LIN 1/8SFT CC	1203-0095	ALLEN BRADLEY	WAZG056S203UA
R 65	RES-3.3MEG 5% 1/4W CC	1066-3355	ALLEN BRADLEY	CB3355
R 67	POT-5MEG 10% 1/2W LIN 1/8SFT CC	1203-0096	ALLEN BRADLEY	WAZG056S505UA
R 68	RES-5.1MEG 5% 1/4W CC	1066-5155	ALLEN BRADLEY	CB 5155
R 69	RES-5.1MEG 5% 1/4W CC	1066-5155	ALLEN BRADLEY	CB 5155
R 70	RES-3.3MEG 5% 1/4W CC	1066-3355	ALLEN BRADLEY	CB3355
R 71	POT-100K 20% 1/2W 1T CERMET TRMR	1215-0046	BECKMAN	91AR100K
R 72	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 66 S1	POT-10K 10% 1/2W LIN 1/8 SFT CC W/SPST	1203-0094	ALLEN BRADLEY	WRS1G056S103UA



REF. DESIGNATOR	APPROX. LOCATION
R7	NEAR Q4
Q17	NEAR R2
Q18	NEAR R7
R12	NEAR J4

NOTE

6. ALL DIODES ARE IN3064 UNLESS OTHERWISE NOTED.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-48. 41000 Vertical Amplifier.

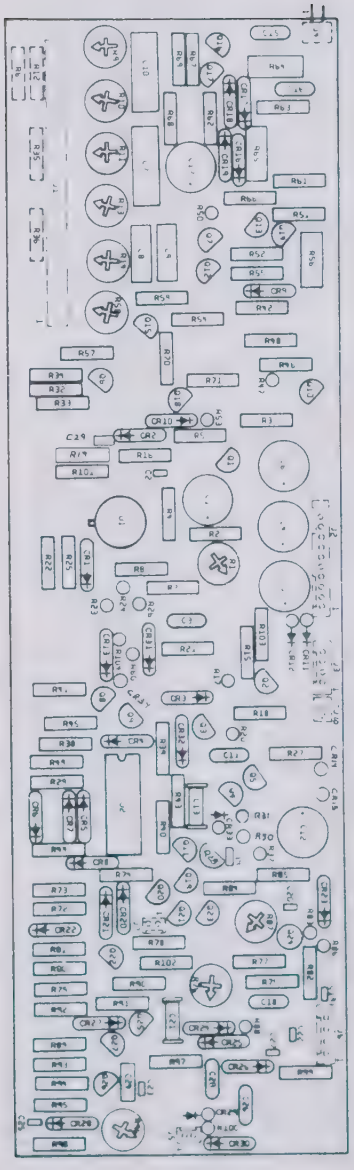


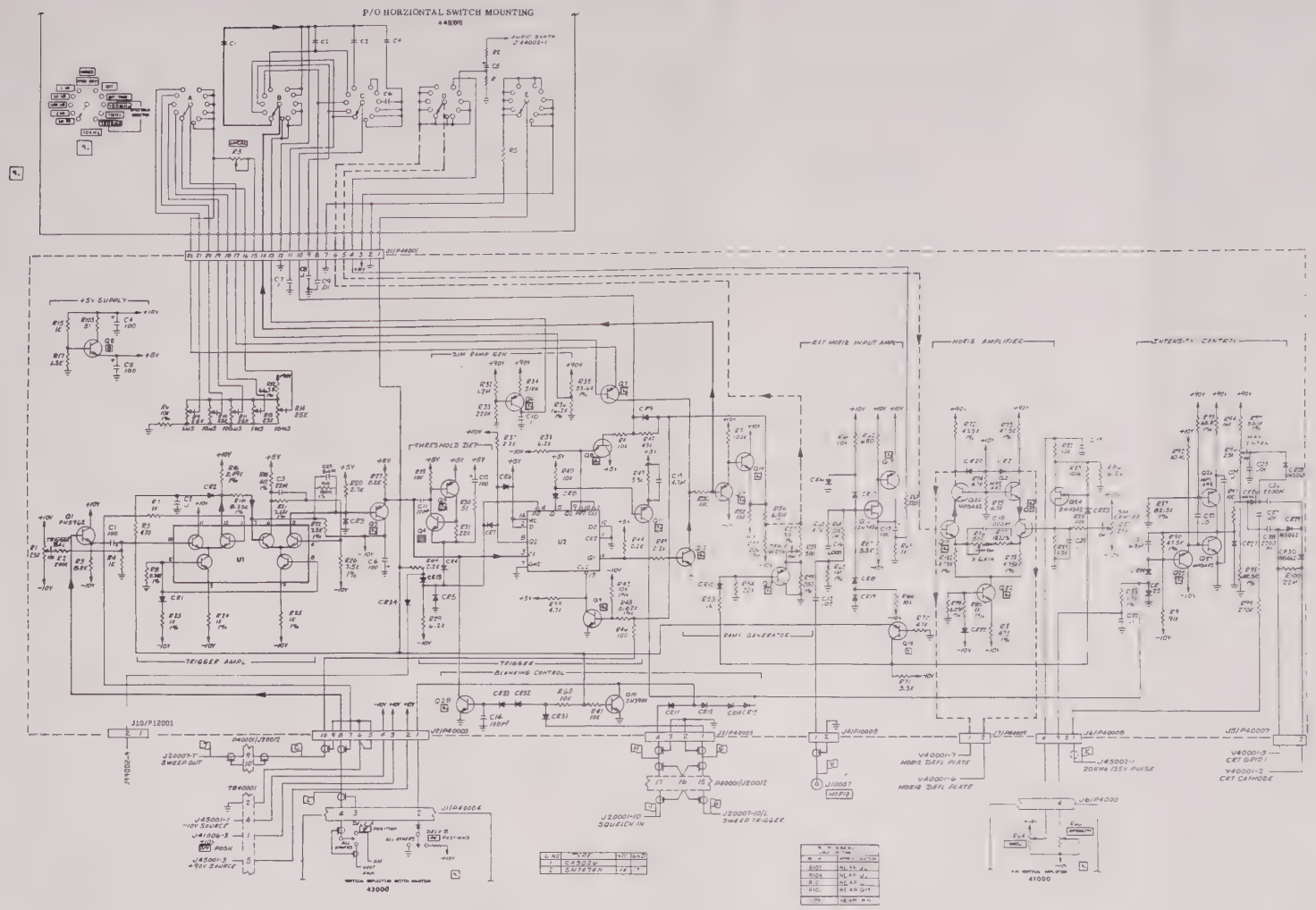
Figure 6-49 42000 Time Base and Horizontal Amplifier, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
42000	PCB ASSY - TIME BASE & HORIZ AMP	7001-0717	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0999	CUSHMAN	
	CAPACITOR			
C 1	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 2	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 3	CAP-22PF 5% 500V DIP MICA	1002-0023	CORNELL DUBILIER	CD15CD220J
C 4	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 5	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 6	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 7	CAP-1UF 10% 100V RDL MET-POLYESTER	1008-0100	PLESSEY	60H105K100
C 8	CAP-.1UF 10% 100V RDL MET-POLYESTER	1008-0098	PLESSEY	60C104K100
C 9	CAP-.01UF 10% 600V RDL MET-POLYESTER	1008-0099	PLESSEY	60103K630
C 10	CAP-1UF 10% 100V RDL MET-POLYESTER	1008-0100	PLESSEY	60H105K100
C 11	CAP-10PF 5% 500V DIP MICA	1002-0016	ELMENCO	DM15-C-100J
C 12	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 13	CAP-4.7PF .25PF 500V NPO CER TUB	1005-0015	TUSONIX	301-000-C0H0-479C
C 14	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 15	CAP-.05UF +80-20% 500V Z5U CER DISC	1005-0052	SPRAGUE	5HK-S50
C 16	CAP-.005UF GMV 1KV Z5U CER DISC	1005-0009	CENTRALAB	DD-502
C 17	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 18	CAP-1000PF 5% 100V DIP MICA	1002-0015	ELMENCO	DM15-F-102J
C 19	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 20	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 21	CAP-6.8PF .25PF 500V NPO CER TUB	1005-0006	TUSONIX	301-000-C0H0-689C
C 22	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 23	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 24	CAP-.1UF 10% 100V MLD CER	1005-0064	AEROVOX	CK06BX104K
C 25	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 26	CAP-2200PF 20% 3KV Z5U CER DISC	1005-0098	CRL	DD30222M
C 27	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 28	CAP-2200PF 20% 3KV Z5U CER DISC	1005-0098	CRL	DD30222M
C 29	CAP-5.6PF 10% 100V NPO MINTR CER	1005-0111	TUSONIX	8101-100-C0G0-569D
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 10	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 11	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 12	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 13	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 14	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 15	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 16	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 17	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 18	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 19	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 20	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 21	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 22	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR NO.
CR 23	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 24	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 25	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 26	DIO-1N5062 SI RECT A94G 800PRV	1281-0030	G.E.	1N5062
CR 27	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 28	DIO-1N5062 SI RECT A94G 800PRV	1281-0030	G.E	1N5062
CR 29	DIO-1N5062 SI RECT A94G 800PRV	1281-0030	G.E.	1N5062
CR 30	DIO-1N5062 SI RECT A94G 800PRV	1281-0030	G.E.	1N5062
CR 31	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 32	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 33	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 34	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	CONNECTOR			
J 1	CONN-10PIN .1SP RTANG FLAT CA JK	2535-0185	BURNDY	HBRB10R-1
J 1	CONN-12PIN .1SP RTANG FLAT CA JK	2535-0186	BURNDY	HBRB12R-1
J 2	CONN-10 PIN .1SP STR LKG PCB MT JK	2535-0150	METHODE	100-8-110-01
J 3	CONN-4PIN .1SP STR LKG PCB MT JK	2535-0144	MOLEX INC	22-27-2041
J 4	CONN-2 PIN .1SP RTANG LKG PCB MT JK	2535-0172	METHODE	1100-9-102-01
J 5	CONN-2 PIN .1SP STR LKG PCB MT JK	2535-0142	MOLEX INC	22-27-2021
J 6	CONN-4PIN .1SP STR LKG PCB MT JK	2535-0144	MOLEX INC	22-27-2041
J 7	CONN-2 PIN .1SP STR LKG PCB MT JK	2535-0142	MOLEX INC	22-27-2021
J 10	CONN-2 PIN .1SP STR LKG PCB MT JK	2535-0142	MOLEX INC	22-27-2021
	TRANSISTOR			
Q 1	XSTR-2N5962 NPN SI T092 LOW PWR	1272-0059	FAIRCHILD	2N5962
Q 2	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 3	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 4	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 5	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 6	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 7	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 8	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 9	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 10	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 11	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 12	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 13	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 14	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 15	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 16	XSTR-2N5486 SI T092 J-FET N-CHAN	1272-0093	MOTOROLA	2N5486
Q 17	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 18	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 19	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 20	XSTR-MPSA42 NPN SI T092 LOW PWR	1272-0089	MOTOROLA	MPSA42
Q 21	XSTR-MPSA42 NPN SI T092 LOW PWR	1272-0089	MOTOROLA	MPSA42
Q 22	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 23	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 24	XSTR-2N4342 SI R124B J-FET P-CHAN	1272-0027	MOTOROLA	2N4342
Q 25	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 26	XSTR-MPSA92 PNP SI T092 LOW PWR	1272-0088	MOTOROLA	MPSA92
Q 27	XSTR-MPSA42 NPN SI T092 LOW PWR	1272-0089	MOTOROLA	MPSA42
Q 28	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
	RELAY			
R 1	POT-25K 20% 1/2W 1T CERMET TRMR	1215-0045	BECKMAN	91AR25K
R 2	RES-200K 5% 1/4W CC	1066-2045	ALLEN BRADLEY	CB2045

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 3	RES-8.2K 5% 1/4W CC	1066-8225	ALLEN BRADLEY	CB 8225
R 4	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 5	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 6	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 7	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 8	RES-2.74K 1% 100PPM FILM	1075-0071	CAT.LIST	55-025
R 9	POT-25K 20% 1/2W 1T CERMET TRMR	1215-0045	BECKMAN	91AR25k
R 10	POT-25K 20% 1/2W 1T CERMET TRMR	1215-0045	BECKMAN	91AR25K
R 11	POT-25K 20% 1/2W 1T CERMET TRMR	1215-0045	BECKMAN	91AR25K
R 12	RES-66.5K 1% 100PPM FILM	1075-0143	CAT. LIST	55-100
R 13	POT-25K 20% 1/2W 1T CERMET TRMR	1215-0045	BECKMAN	91AR25K
R 14	POT-25K 20% 1/2W 1T CERMET TRMR	1215-0045	BECKMAN	91AR25K
R 15	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 16	RES-2.49K 1% 100PPM FILM	1075-0027	CAT.LIST	55-100
R 17	RES-1.3K 5% 1/4W CC	1066-1325	ALLEN BRADLEY	CB1325
R 18	RES-412 OHM 1% 100PPM FILM	1075-0084	CAT.LIST	55-100
R 19	RES-150K — 1% 100PPM FILM	1075-0152	CAT. LIST	55-100
R 20	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 21	RES-7.68K 1% 100PPM FILM	1075-0054	CAT.LIST	55-100
R 22	RES-7.5K 1% 100PPM FILM	1075-0158	CAT. LIST	55-100
R 23	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 24	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 25	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 26	RES-7.5K 1% 100PPM FILM	1075-0158	CAT. LIST	55-100
R 27	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 28	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 29	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 30	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 31	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 32	RES-1.2MEG 5% 1/4W CC	1066-1255	ALLEN BRADLEY	CB1255
R 33	RES-220K 5% 1/4W CC	1066-2245	ALLEN BRADLEY	CB2245
R 34	RES-510K 5% 1/4W CC	1066-5145	ALLEN BRADLEY	CB 5145
R 35	RES-53.6K 1% 150PPM FILM	1074-1023	CAT.LIST	55-100
R 36	RES-16.2K 1% 100PPM FILM	1075-0057	CAT.LIST	55-100
R 37	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 38	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 39	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 40	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 41	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 42	RES-43K 5% 1/4W CC	1066-4335	ALLEN BRADLEY	CB 4335
R 43	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 44	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 45	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 46	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 47	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 48	RES-5.62K 1% 100PPM FILM	1075-0013	CAT.LIST	55-100
R 49	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 50	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 51	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 52	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 53	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 54	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 55	RES-20K 1% 100PPM FILM	1075-0096	CAT.LIST	55-100
R 56	RES-6.81K 1% 100PPM FILM	1075-0140	CAT. LIST	55-100
R 57	RES-301 OHM 1% 100PPM FILM	1075-0048	CAT.LIST	55-100
R 58	POT-500 OHM 20% 1/2W 1T CERMET TRMR	1215-0042	BECKMAN	91AR500

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 59	RES-200 OHM 1% 100PPM FILM	1075-0082	CAT.LIST	55-100
R 60	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 61	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 62	RES-680 OHM 5% 1/4W CC	1066-6815	ALLEN BRADLEY	CB 6815
R 63	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 64	RES-120K 5% 1W CC	1068-1245	ALLEN BRADLEY	GB 1245
R 65	RES-1MEG 1% 150PPM FILM	1074-1039	CAT.LIST	55-100
R 66	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 67	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 68	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 69	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 70	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 71	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 72	RES-47.5K 1% 100PPM FILM	1075-0076	CAT.LIST	55-100
R 73	RES-47.5K 1% 100PPM FILM	1075-0076	CAT.LIST	55-100
R 74	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 75	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 76	POT-500 OHM 20% 1/2W 1T CERMET TRMR	1215-0042	BECKMAN	91AR500
R 77	RES-182 OHM 1% 150PPM FILM	1074-1014	CAT.LIST	55-100 55-100
R 78	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 79	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 80	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 81	RES-475 OHM 1% 100PPM FILM	1075-0023	CAT.LIST	55-100
R 82	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 83	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 84	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 85	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 86	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 87	POT-25K 20% 1/2W 1T CERMET TRMR	1215-0045	BECKMAN	91AR25K
R 88	RES-11.3K 1% 100PPM FILM	1075-0034	CAT.LIST	55-100
R 89	RES-82.5K 1% 25PPM FILM	1075-0161	CAT. LIST	55-025
R 90	RES-47.5K 1% 100PPM FILM	1075-0076	CAT.LIST	55-100
R 91	RES-91K 5% 1/4W CC	1066-9135	ALLEN BRADLEY	CB 9135
R 92	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 93	RES-68.1K 1% 100PPM FILM	1075-0136	DALE	MFF 1/8 T1
R 94	RES-16K 5% 1/4W CC	1066-1635	ALLEN BRADLEY	CB1635
R 95	RES-30.1K 1% 25PPM FILM	1074-0107	CAT.LIST	55-025
R 96	POT-25K 20% 1/2W 1T CERMET TRMR	1215-0045	BECKMAN	91AR25K
R 97	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 98	RES-82.5K 1% 25PPM FILM	1075-0161	CAT. LIST	55-025
R 99	RES-270K 5% 1/4W CC	1066-2745	ALLEN BRADLEY	CB2745
R 100	RES-22MEG 5% 1/4W CC	1066-2265	ALLEN BRADLEY	CB2265
R 101	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 102	RES-4.75K 1% 100PPM FILM	1075-0038	CAT.LIST	55-100
R 103	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 104	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
	INTEGRATED CIRCUIT			
U 1	IC-CA3026	2025-0026	RCA	CA3026
U 2	IC-7474 DUAL D POS EDG TRIG FF W/P&C	2025-0166	TI	SN7474N



1. VIEW SHOWN FOR FUCTIONAL REFERENCE ONLY.
2. ALL TRANSISTORS ARE 2N5088 UNLESS OTHERWISE NOTED.
3. ALL TRANSISTORS ARE 2N5087 UNLESS OTHERWISE NOTED.
4. ALL DIODES ARE 1N3064 UNLESS OTHERWISE NOTED.
5. [illegible] ARE DC UNLESS OTHERWISE NOTED.
6. [illegible] UNLESS OTHERWISE NOTED.

Figure 6-50. 42000 Time Base and Horizontal Amplifier.

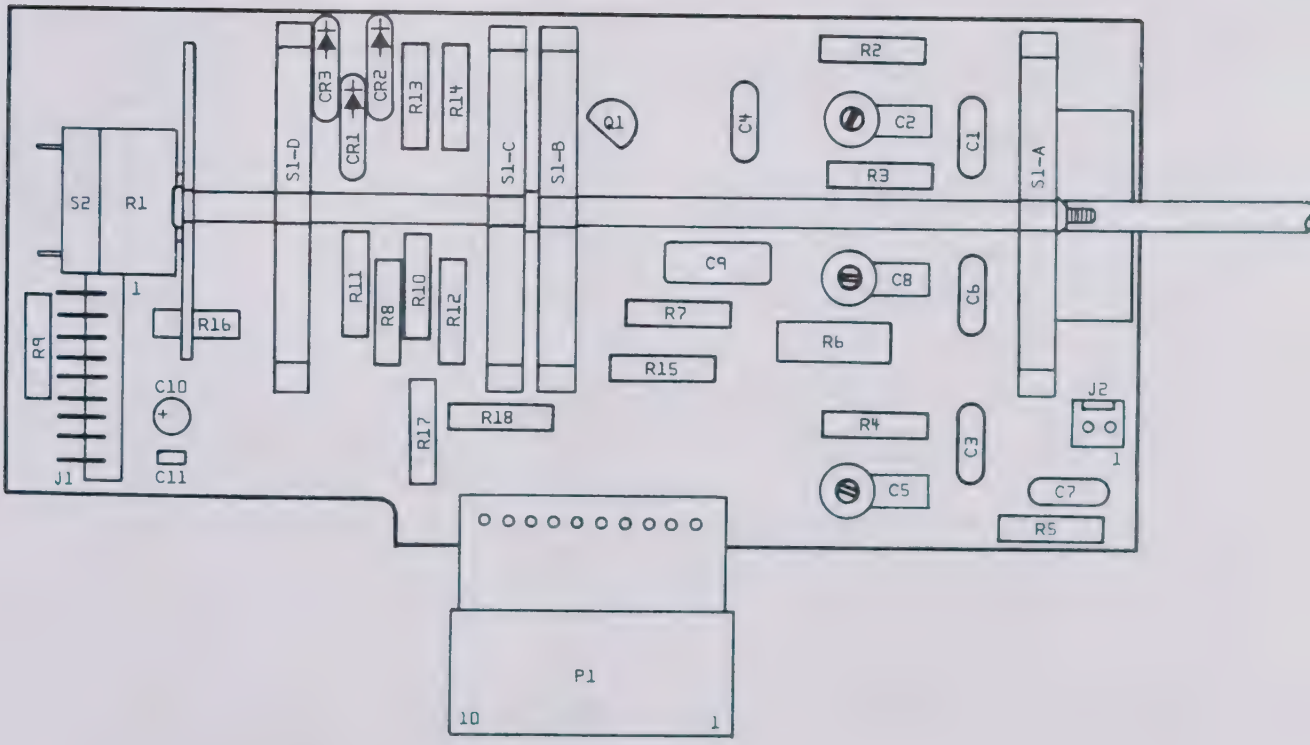
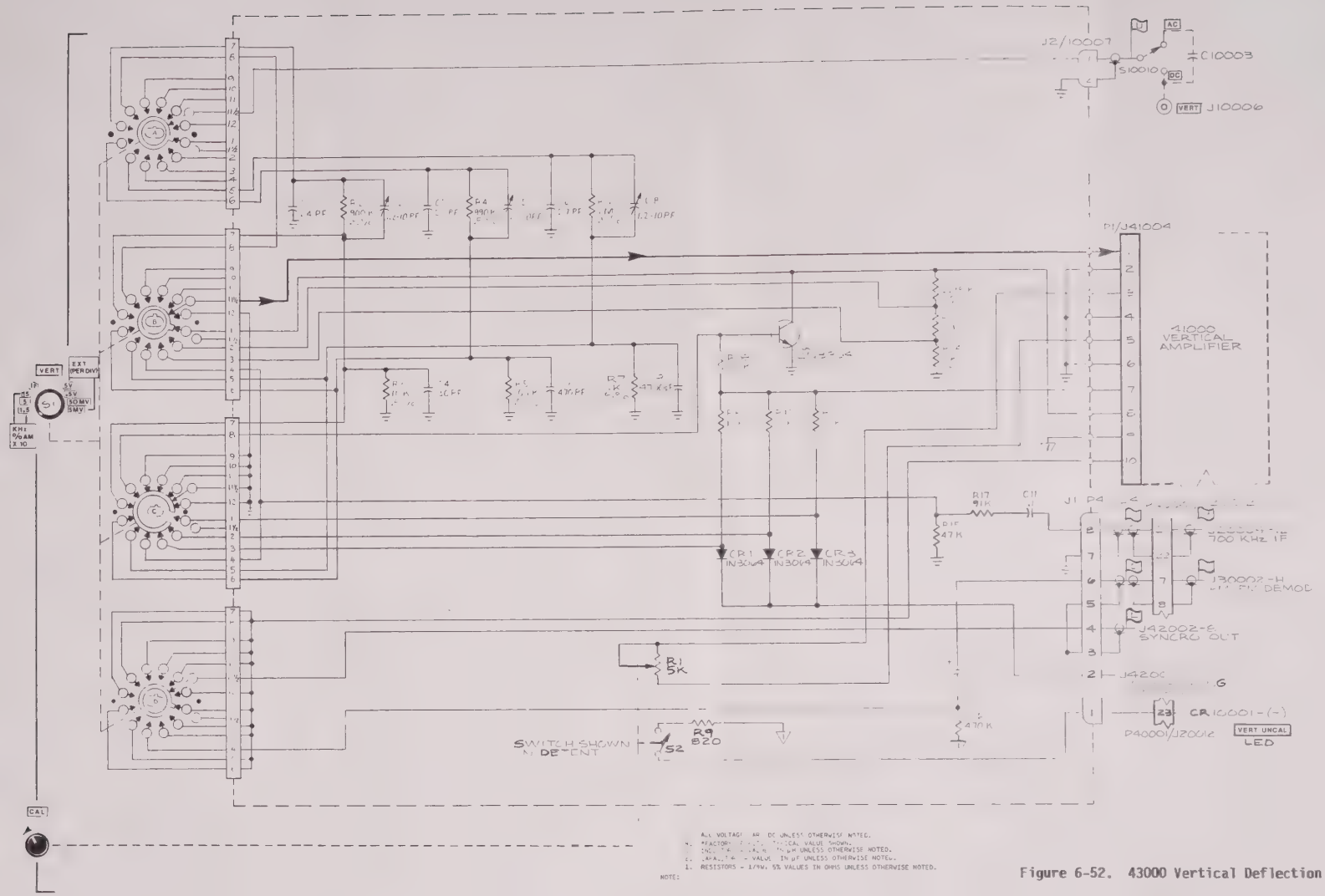


Figure 6-51. 43000 Vertical Deflection Switch Mounting, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
43000	PCB ASSY - VERT DEFLECT SW MTG	7001-0628	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1052	CUSHMAN	
	CAPACITOR			
C 1	CAP-24PF 5% 500V DIP MICA	1002-0051	ELMENCO	DM15-C-240J
C 2	CAP-1.2-10PF 250V NO75 CER PSTN TRMR	1001-0020	STETTNER-TRUSH	311505S 1.2/10 N075
C 3	CAP-27PF 5% 500V DIP MICA	1002-0008	ELMENCO	DM15-E-270J
C 4	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 5	CAP-1.2-10PF 250V NO75 CER PSTN TRMR	1001-0020	STETTNER-TRUSH	311505S 1.2/10 N075
C 6	CAP-27PF 5% 500V DIP MICA	1002-0008	ELMENCO	DM15-E-270J
C 7	CAP-470PF 5% 500V DIP MICA	1002-0035	SANGAMO	D155F471
C 8	CAP-1.2-10PF 250V NO75 CER PSTN TRMR	1001-0020	STETTNER-TRUSH	311505S 1.2/10 N075
C 9	CAP-.0047UF 2% 200V AXL POLYCARBONATE	1008-0088	IMB	DV2C472G
C 10	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 11	CAP-1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	CONNECTOR			
J 1	CONN-8 PIN .1SP RTANG LKG PCB MT JK	2535-0178		
J 2	CONN-2 PIN .1SP STR LKG PCB MT JK	2535-0142	MOLEX INC	22-27-2021
	TRANSISTOR			
Q 1	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
	RESISTOR			
R 1	SW-RTRY CNCTRC 4 POLE 8 POS W/POT/SPST	1851-0112		
R 2	RES-900K .5% 100PPM FILM	1075-0178	SHELLY RODABAUGH	CMF55
R 3	RES-111K .5% 100PPM FILM	1075-0177	SHELLY RODABAUGH	CMF55
R 4	RES-990K .5% 100PPM FILM	1075-0179	SHELLY RODABAUGH	CMF55
R 5	RES-10.1K .5% 100PPM FILM	1075-0176	SHELLY RODABAUGH	CMF55
R 6	RES-1 MEG .5% 100PPM FILM	1075-0180	SHELLY RODABAUGH	CMF55
R 7	RES-1K .5% 100PPM FILM	1075-0175	SHELLY	CMF55
R 8	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 9	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215
R 10	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 11	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 12	RES-6.98K 1% 150PPM FILM	1074-1028	CAT.LIST	55-025
R 13	RES-2K 1% 100PPM FILM	1075-0103	CAT.LIST	55-100
R 14	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 15	RES-47K 5% 1/4W CC	1066-4735	ALLEN BRADLEY	CB 4735
R 16	RES-470K 5% 1/4W CC	1066-4745	ALLEN BRADLEY	CB 4745
R 17	RES-91K 5% 1/4W CC	1066-9135	ALLEN BRADLEY	CB 9135
R 18	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
	SWITCH			
S 1	SW-RTRY CNCTRC 4 POLE 8 POS W/POT/SPST	1851-0112		
S 2	SW-RTRY CNCTRC 4 POLE 8 POS W/POT/SPST	1851-0112		



NOTE:
1. ALL VOLTAGE ARE DC UNLESS OTHERWISE NOTED.
2. *FACTORY [illegible] TYPICAL VALUE SHOWN.
3. [illegible] UNLESS OTHERWISE NOTED.
4. CAPACITOR - VALUE IN µF UNLESS OTHERWISE NOTED.
5. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-52. 43000 Vertical Deflection Switch Mounting.

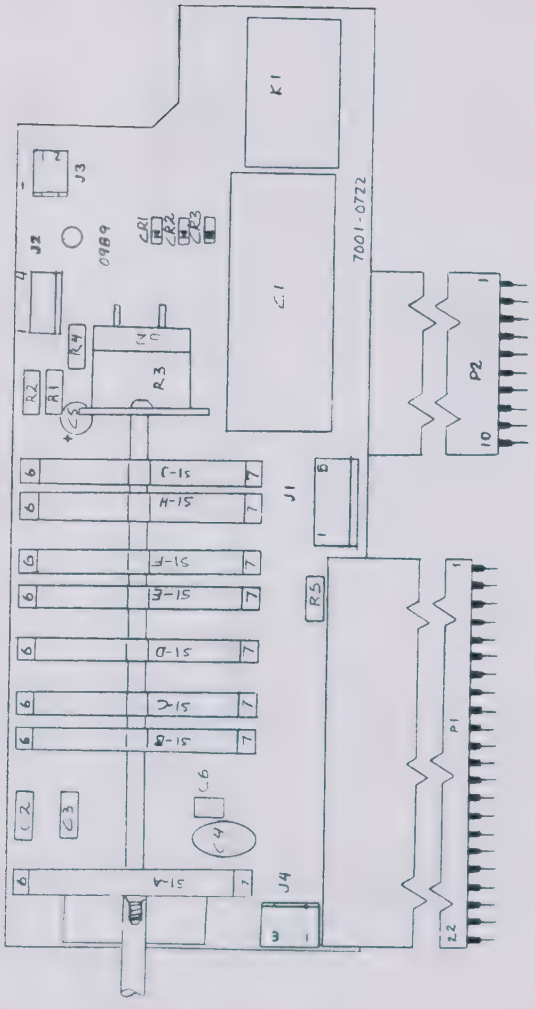
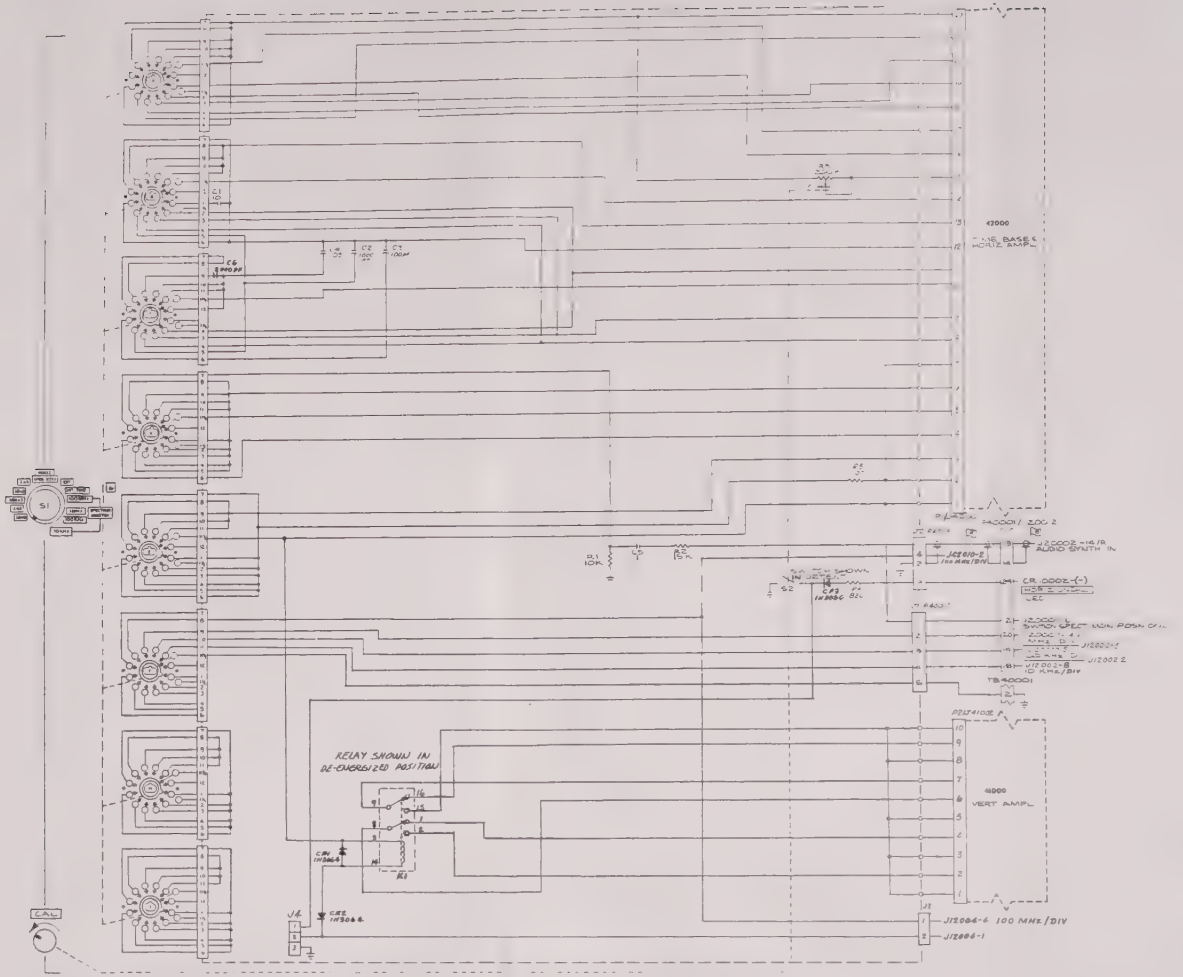


Figure 6-53. 44000 Horizontal Deflection Switch Mounting, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
44000	PCB ASSY - HORZ DEFLECT SW MTG	7001-0722	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0989	CUSHMAN	
	CAPACITOR			
C 1	CAP-10UF 10% 50V RDL MET-POLYESTER	1008-0101	PLESSEY	60R106K100
C 2	CAP-1000PF 5% 100V DIP MICA	1002-0015	ELMENCO	DM15-F-102J
C 3	CAP-100PF 5% 500V DIP MICA	1002-0011	ELMENCO	DM15-F-101J
C 4	CAP-.05UF +80-20% 25V Y5U CER DISC	1005-0014	TUSONIX	5835-514-Y5U-503Z
C 5	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 6	CAP-2000PF 5% 100V NPO MINTR CER	1005-0129	CENTRE	200-100-NPO-202J
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	CONNECTOR			
J 1	CONN-5 PIN .1SP STR LKG PCB MT JK	2535-0145	MOLEX INC	22-27-2051
J 2	CONN-4PIN .1SP STR LKG PCB MT JK	2535-0144	MOLEX INC	22-27-2041
J 3	CONN-2 PIN .1SP STR LKG PCB MT JK	2535-0142	MOLEX INC	22-27-2021
J 4	CONN-3 PIN .1SP STR LKG PCB MT JK	2535-0143	METHODE	1100-8-103-01
	RELAY			
K 1	RLY-DPDT 12VC COIL 2 FORM C PCB MT	1313-0029	AROMAT CORP	HB2-12V
	RESISTOR			
R 1	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 2	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 3	SW-RTRY CNCTRC 8 POLE W/POT/SPST	1851-0136	CTS	C/E DWG
R 4	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215
R 5	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
	SWITCH			
S 1	SW-RTRY CNCTRC 8 POLE W/POT/SPST	1851-0136	CTS	C/E DWG
S 2	SW-RTRY CNCTRC 8 POLE W/POT/SPST	1851-0136	CTS	C/E DWG



NOTE
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT TYPICAL VALUE SHOWN
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.

Figure 6-54. 44000 Horizontal Deflection Switch Mounting.

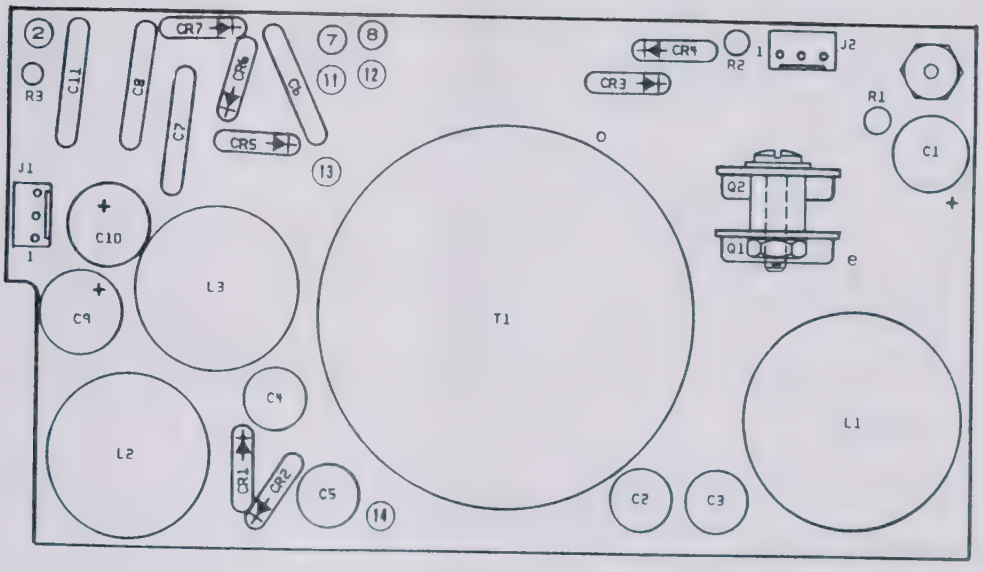
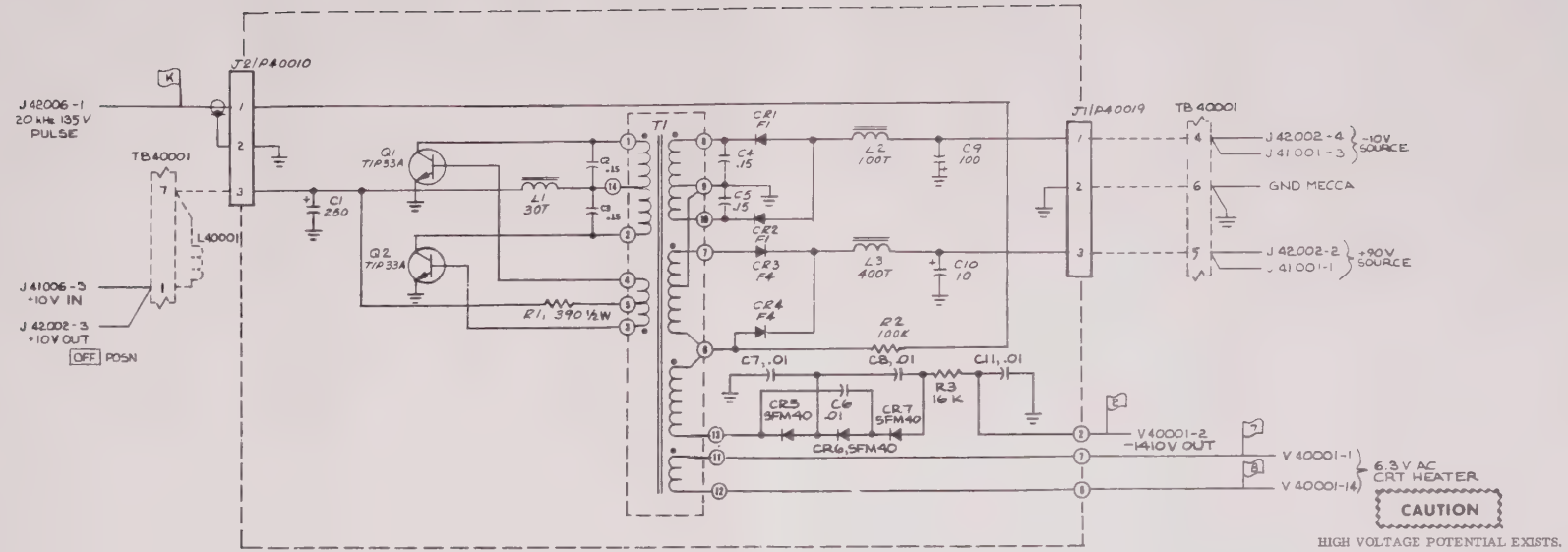


Figure 6-55. 45000 DC/DC Converter, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO
45000	PCB ASSY - DC/DC CONVERTER	7001-0613	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1084	CUSHMAN	
	CAPACITOR			
C 1	CAP-250UF +75-10% 16V AXL ELCTLT	1013-0016	CORNELL DUBILIER	NLW250-16
C 2	CAP-.15UF 10% 200V AXL POLYESTER	1008-0035	SPRAGUE	192P15492
C 3	CAP-.15UF 10% 200V AXL POLYESTER	1008-0035	SPRAGUE	192P15492
C 4	CAP-.15UF 10% 200V AXL POLYESTER	1008-0035	SPRAGUE	192P15492
C 5	CAP-.15UF 10% 200V AXL POLYESTER	1008-0035	SPRAGUE	192P15492
C 6	CAP-.01UF 20% 1.4KV CER DISC	1005-0051	SPRAGUE	125L-S10
C 7	CAP-.01UF 20% 1.4KV CER DISC	1005-0051	SPRAGUE	125L-S10
C 8	CAP-.01UF 20% 1.4KV CER DISC	1005-0051	SPRAGUE	125L-S10
C 9	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 10	CAP-10UF +75-10% 150V AXL ELCTLT	1013-0017	SPRAGUE	30D106G150DD5
C 11	CAP-.01UF 20% 3KV Z5U CER DISC	1005-0069	SPRAGUE	30GA-S/10
	DIODE			
CR 1	DIO-F1 SI SW A294A 100PRV .5A	1281-0128	SEMTECH	F1
CR 2	DIO-F1 SI SW A294A 100PRV .5A	1281-0128	SEMTECH	F1
CR 3	DIO-F4 SI SW A294A 400PRV.5A	1281-0129	SEMTECH	F4
CR 4	DIO-F4 SI SW A294A 400PRV.5A	1281-0129	SEMTECH	F4
CR 5	DIO-1N4948 SI F RCVY AITC 1000PRV 1A	1282-0019	CODI SEMICONDUCTOR	MRF 1000
CR 6	DIO-1N4948 SI F RCVY AITC 1000PRV 1A	1282-0019	CODI SEMICONDUCTOR	MRF 1000
CR 7	DIO-1N4948 SI F RCVY AITC 1000PRV 1A	1282-0019	CODI SEMICONDUCTOR	MRF 1000
	CONNECTOR			
J 1	CONN-3 PIN .1SP STR LKG PCB MT JK	2535-0143	METHODE	1100-8-103-01
J 2	CONN-3 PIN .1SP STR LKG PCB MT JK	2535-0143	METHODE	1100-8-103-01
	INDUCTOR			
L 1	INDCTR-POT CORE 26X16/30.5T/20GA	1596-0265		
L 2	INDCTR-POT CORE 18X11/100.5T/28GA	1596-0267		
L 3	INDCTR-POT CORE 18X11/400.5T/36GA	1596-0266		
	TRANSISTOR			
Q 1	XSTR-TIP33A NPN SI X86 HIGH PWR/SW	1272-0084	TI	TIP33A
Q 2	XSTR-TIP33A NPN SI X86 HIGH PWR/SW	1272-0084	TI	TIP33A
	RESISTOR			
R 1	RES-390 OHM 5% 1/2W CC	1067-3915	ALLEN BRADLEY	EB 3915
R 2	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 3	RES-16K 5% 1/4W CC	1066-1635	ALLEN BRADLEY	CB1635
	TRANSFORMER			
T 1	XFMR-POT CORE 42X29	1575-0057	MINI-MAGNETICS	C/E DWG



NOTE
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES μH UNLESS OTHERWISE NOTED
4. *FACTORY SELECT. TYPICAL VALUE SHOWN
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.

Figure 6-56. 45000 DC/DC Converter.

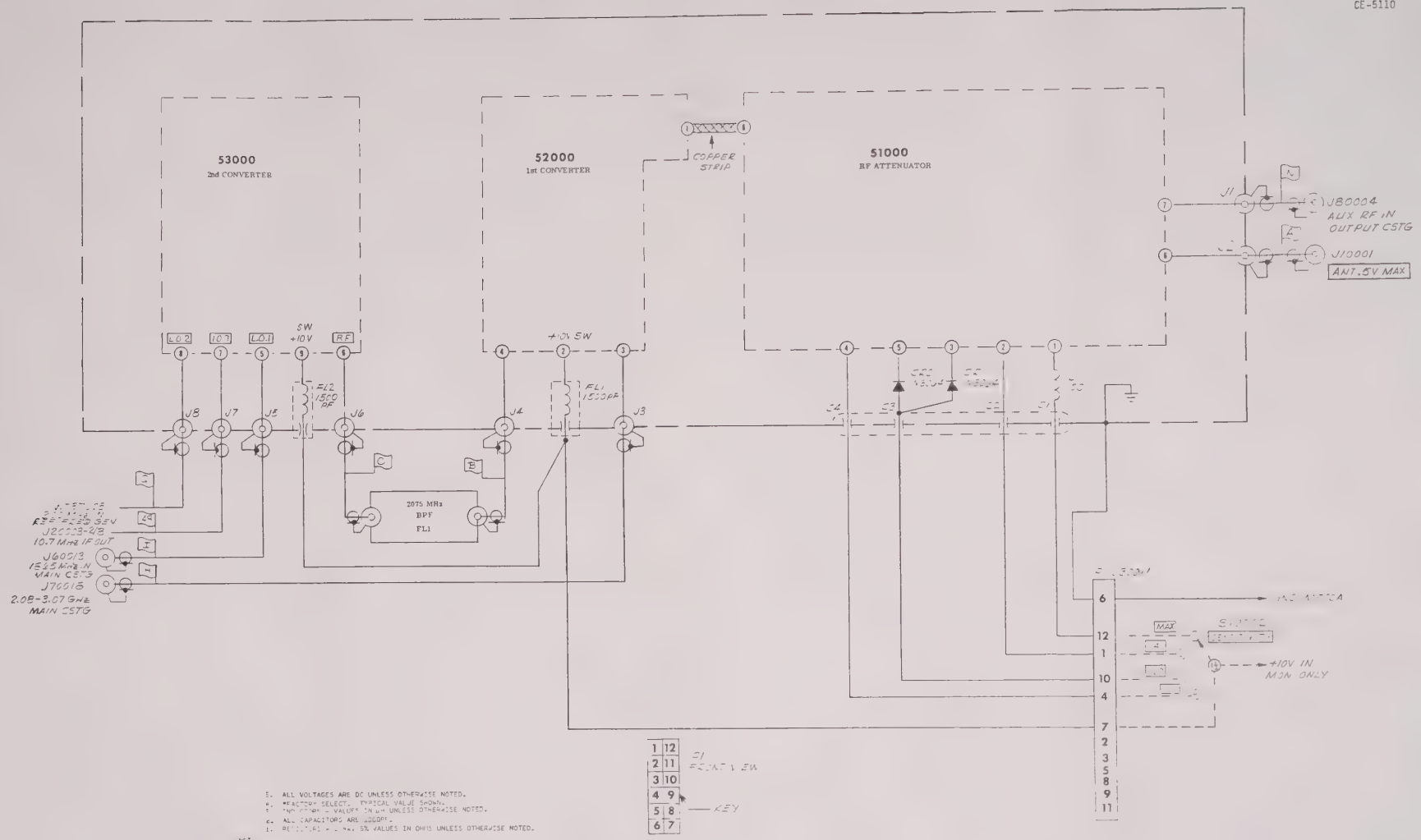


Figure 6-57. 50000 RF Receiver Casting.

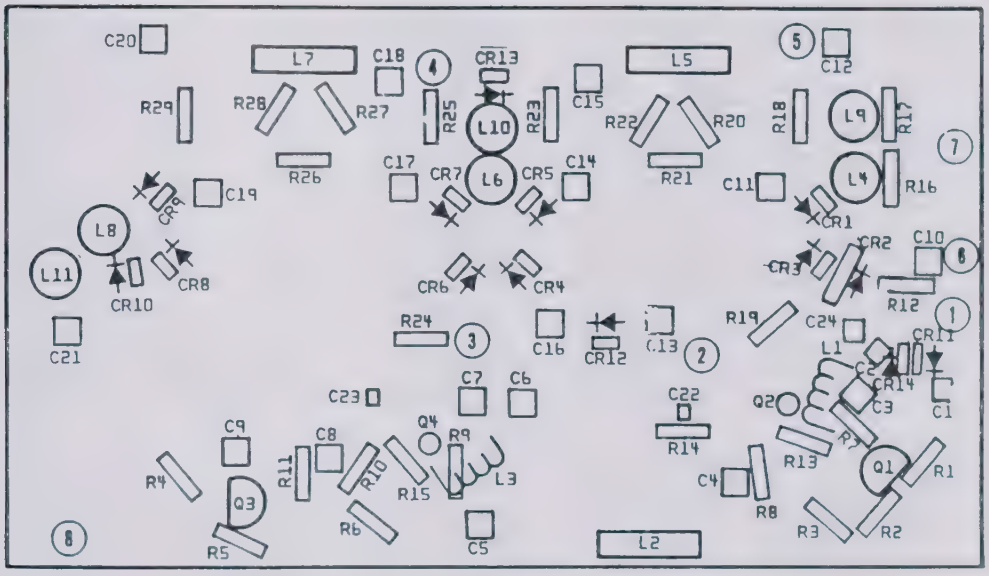
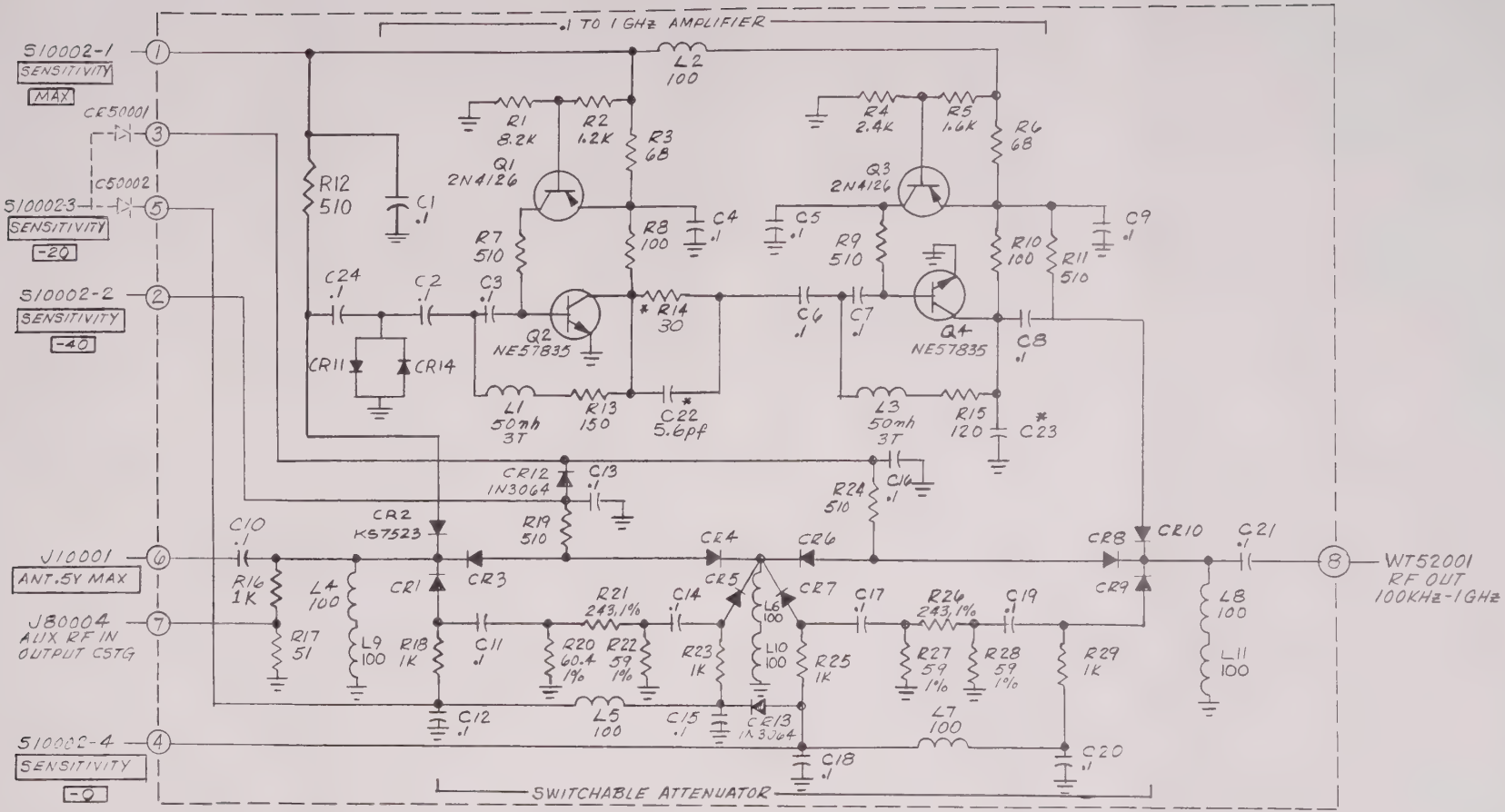


Figure 6-58. 51000 RF Attenuator, Component Location.

REF DES	DESCRIPTION	CE STOCK NO	MFR	MFR NO
	PCB ASSY - RF ATTEN	7001-0507	CUSHMAN	CE-50A, -1, /TC
	PRINTED CIRCUIT BOARD	1780-1009	CUSHMAN	
	CAPACITOR			
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	CAP-5.6PF 10% 100V NPO MINTP CER	1005-0111	TUSONIX	8101-100-C0G0-569D
	CAP-.1UF 20% 50V MINTP CER RED	1005-0097	ERIE	8121-050-651-104M
	DIODE			
CR 1	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 2	DIO-KS7523 SI PIN DET	1281-0153	KSW ELECTRONICS CORP	KS7523
CR 3	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 4	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 5	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 6	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 7	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 8	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 9	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 10	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 11	DIO-1N3062 SI SW DET 1PF 75PRV	1281-0080	ITT	1N3062
CR 12	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 13	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 14	DIO-1N3062 SI SW DET 1PF 75PRV	1281-0080	ITT	1N3062
	INDUCTOR			
L 1	COIL-AIR CORE .090 DIA/22GA/3T	1596-0271		
L 2	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 3	COIL-AIR CORE .090 DIA/22GA/3T	1596-0271		
L 4	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 5	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 6	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 7	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 8	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 9	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 10	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR	MFR. NO.
	TRANSISTOR			
Q 1	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 2	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 3	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 4	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
	RESISTOR			
R 1	RES-8.2K 5% 1/8W CC	1065-8225	ALLEN BRADLEY	BB8225
R 2	RES-1.2K 5% 1/8W CC	1065-1225	AB	BB1225
R 3	RES-68 OHM 5% 1/8W CC	1065-6805	ALLEN BRADLEY	RC05GF680J
R 4	RES-2.4K 5% 1/8W CC	1065-2425	ALLEN BRADLEY	BB2425
R 5	RES-1.6K 5% 1/8W CC	1065-1625	ALLEN BRADLEY	BB1625
R 6	RES-68 OHM 5% 1/8W CC	1065-6805	ALLEN BRADLEY	RC05GF680J
R 8	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 10	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 11	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 12	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 13	RES-150 OHM 5% 1/8W CC	1065-1515	ALLEN BRADLEY	BB1515
R 14	RES-30 OHM 5% 1/8W CC	1065-3005	ALLEN-BRADLEY	BB3005
R 15	RES-120 OHM 5% 1/8W CC	1065-1215		
R 16	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025
R 17	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 18	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025
R 19	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 20	RES-60.4 OHM 1% 100PPM FILM	1074-0115	CAT.LIST	55-100
R 21	RES-243 OHM 1% 100PPM FILM	1074-0114		
R 22	RES-59 OHM 1% 100PPM FILM	1075-0067	CAT.LIST	55-100
R 23	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025
R 24	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 25	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025
R 26	RES-243 OHM 1% 100PPM FILM	1074-0114		
R 27	RES-59 OHM 1% 100PPM FILM	1075-0067	CAT.LIST	55-100
R 28	RES-59 OHM 1% 100PPM FILM	1075-0067	CAT.LIST	55-100
R 29	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025

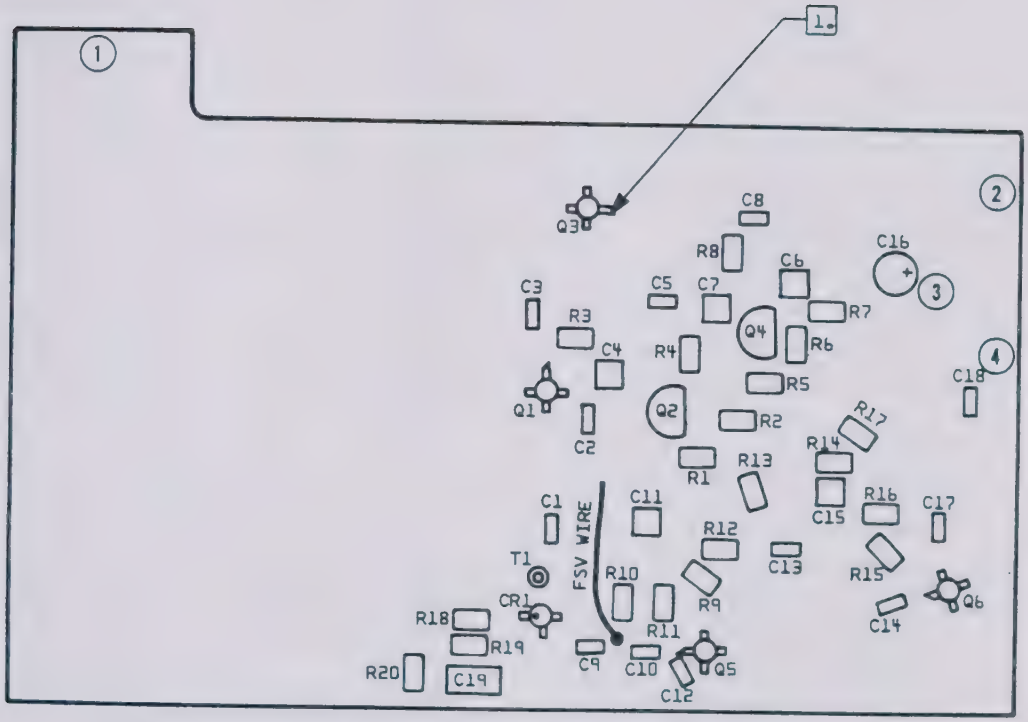


NOTE:

1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
6. ALL DIODES ARE BA 379 UNLESS OTHERWISE NOTED.

SWITCHING CODE				
	+20	0	-20	-40
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	OFF	OFF	ON	OFF
4	OFF	OFF	OFF	ON

Figure 6-59. 51000 RF Attenuator.

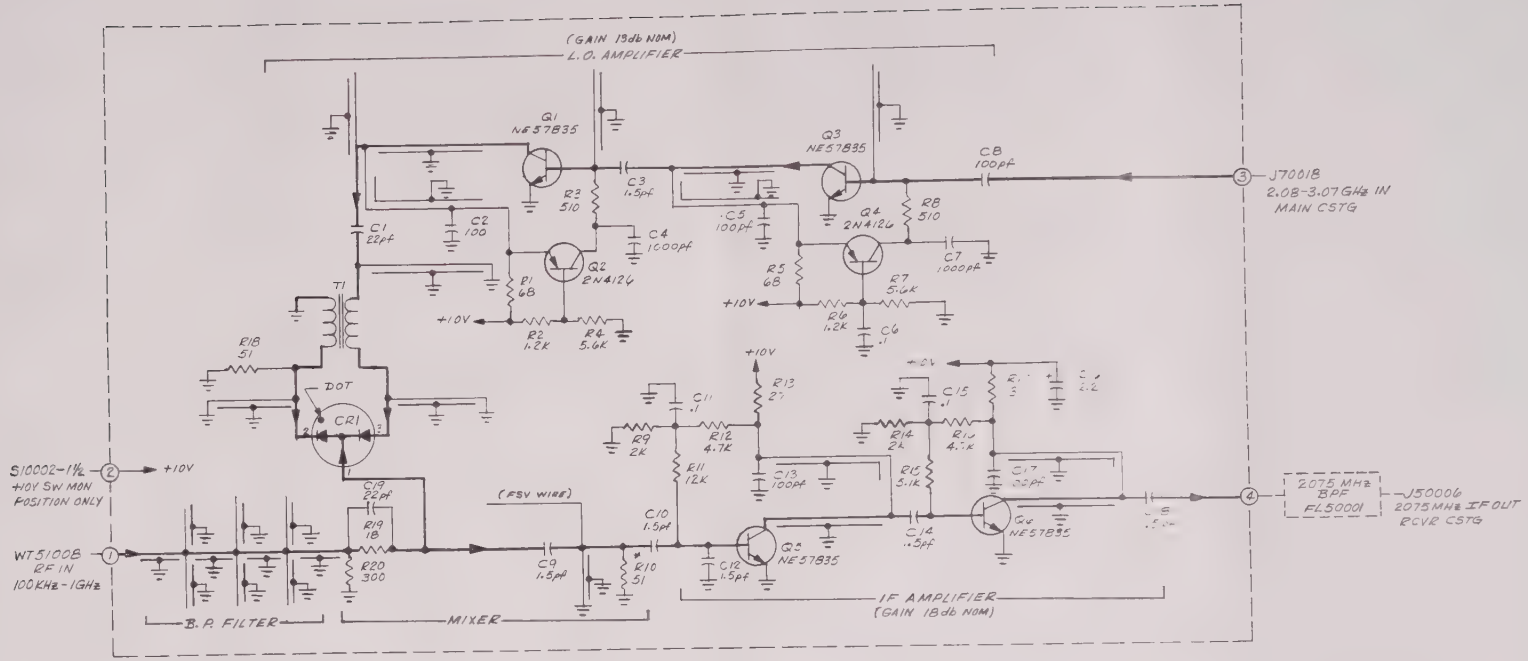


1. BASE LEADS OF Q1,Q3,Q5,AND Q6 ARE ANGLE CUT. ORIENT AS SHOWN.

Figure 6-60 52000 1st Converter, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
52000	PCB ASSY - 1ST. CONVERTER	7001-0508	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1010	CUSHMAN	
	CAPACITOR			
C 1	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 2	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 3	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 4	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 5	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 6	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 7	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 8	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 9	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 10	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 11	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 12	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 13	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 14	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 15	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 16	CAP-2.2UF 10% 35V RDL TANT	1011-0001	SPRAGUE	196D225X9035JA1
C 17	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 18	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 19	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
	DIODE			
CR 1	DIO-DMD6460 SCHOTTKY BARRIER DUAL	1281-0095	ALPHA IND.	DMD-6460-131-012
	TRANSISTOR			
Q 1	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 2	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 3	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 4	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 5	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 6	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
	RESISTOR			
R 1	RES-68 OHM 5% 1/8W CC	1065-6805	ALLEN BRADLEY	RC05GF680J
R 2	RES-1.2K 5% 1/8W CC	1065-1225	AB	BB1225
R 3	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 4	RES-5.6K 5% 1/8W CC	1065-5625	ALLEN BRADLEY	BB5625
R 5	RES-68 OHM 5% 1/8W CC	1065-6805	ALLEN BRADLEY	RC05GF680J
R 6	RES-1.2K 5% 1/8W CC	1065-1225	AB	BB1225
R 7	RES-5.6K 5% 1/8W CC	1065-5625	ALLEN BRADLEY	BB5625
R 8	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 9	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2025
R 10	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 11	RES-12K 5% 1/8W CC	1065-1235	ALLEN BRADLEY	BB1235
R 12	RES-4.7K 5% 1/8W CC	1065-4725	ALLEN BRADLEY	BB4725
R 13	RES-27 OHM 5% 1/8W CC	1065-2705	ALLEN BRADLEY	BB2705
R 14	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2025
R 15	RES-5.1K 5% 1/8W CC	1065-5125	ALLEN BRADLEY	BB5125
R 16	RES-4.7K 5% 1/8W CC	1065-4725	ALLEN BRADLEY	BB4725
R 17	RES-13 OHM 5% 1/8W CC	1065-1305	ALLEN BRADLEY	BB1305
R 18	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 19	RES-18 OHM 5% 1/8W CC	1065-1805	ALLEN BRADLEY	BB1805

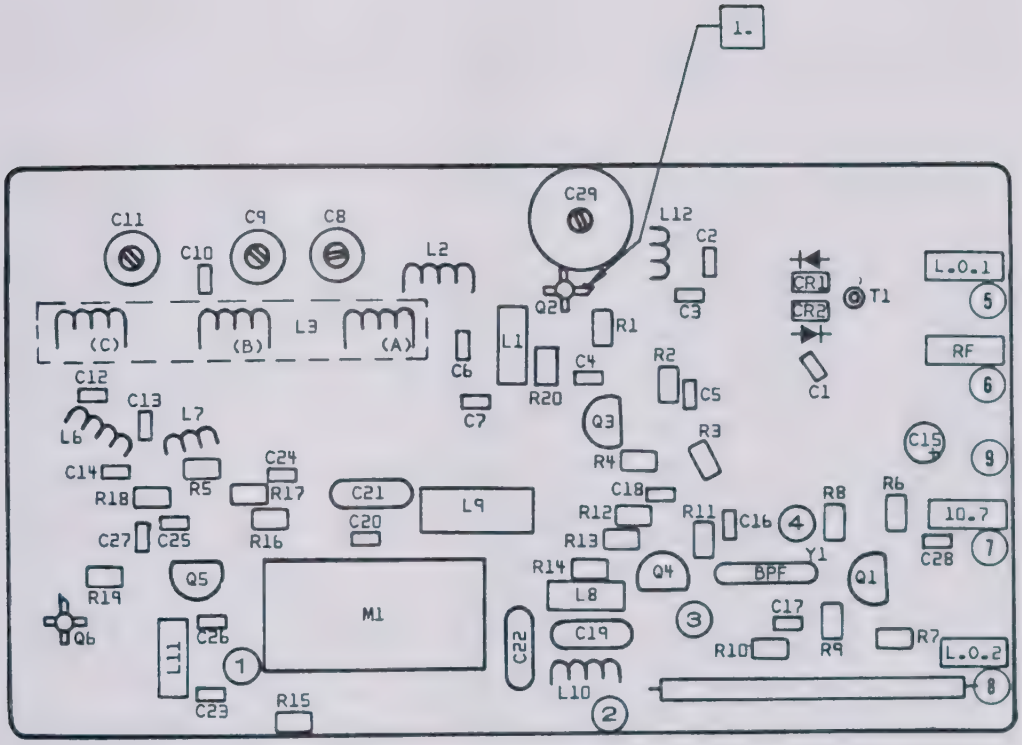
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 20	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
	TRANSFORMER			
T 1	XFMR-TOROIDIAL BIFILAR	1579-0042		



NOTE:

5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4w, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-61. 52000 1st Converter.

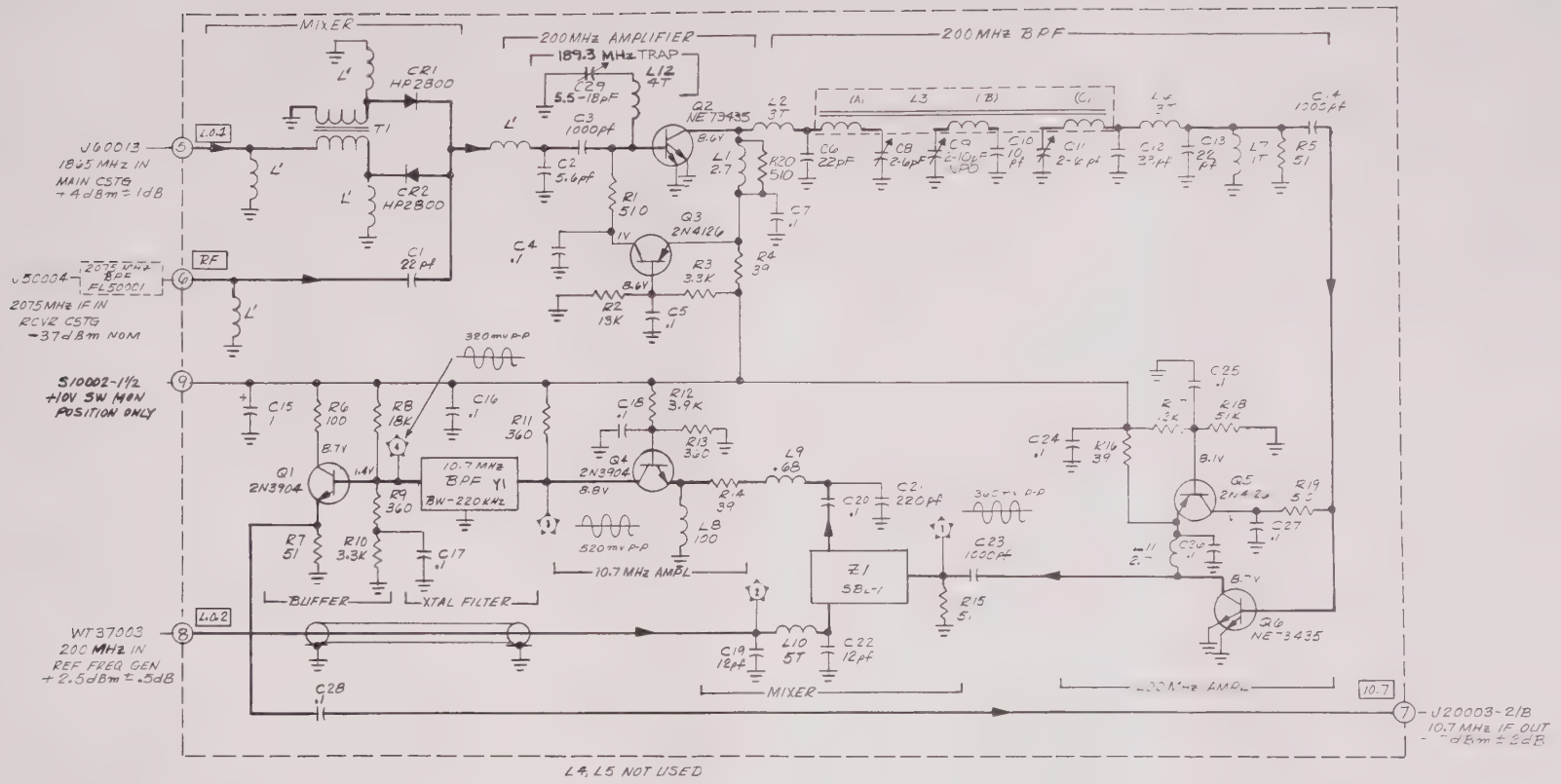


1. BASE LEADS OF Q2 AND Q6 ARE ANGLE CUT. ORIENT AS SHOWN.

Figure 6-62. 53000 2nd Converter, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR NO.
53000	PCB ASSY - 2ND CONVERTER	7001-0509	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1011	CUSHMAN	
	CAPACITOR			
C 1	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 2	CAP-5.6PF 10% 100V NPO MINTR CER	1005-0111	TUSONIX	8101-100-C0G0-569D
C 3	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 4	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 5	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 6	CAP-22PF 5% 500V THIN DIP MICA	1004-0003	CORNELL DUBILIER	CD6CD220J03
C 7	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 8	CAP-2.8-10PF 250V V ADJ CER TRMR	1001-0021	SPRAGUE	GRU10000
C 9	CAP-2-10PF 25V NPO V ADJ CER TRMR	1001-0024	TUSONIX	513-011 A 2-10PF
C 10	CAP-10PF 10% 100V NPO MINTR CER	1005-0074	TUSONIX	8101-100-C0G0-100K
C 11	CAP-2.8-10PF 250V V ADJ CER TRMR	1001-0021	SPRAGUE	GRU10000
C 12	CAP-33PF 5% 500V THIN DIP MICA	1004-0006	CORNELL DUBILIER	CD6ED330J
C 13	CAP-22PF 5% 500V THIN DIP MICA	1004-0003	CORNELL DUBILIER	CD6CD220J03
C 14	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 15	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 16	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 17	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 18	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 19	CAP-12PF 5% 500V DIP MICA	1002-0017	ELMENCO	DM15-C-120J
C 20	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 21	CAP-220PF 5% 500V DIP MICA	1002-0029	ELMENCO	DM15-F-221J
C 22	CAP-12PF 5% 500V DIP MICA	1002-0017	ELMENCO	DM15-C-120J
C 23	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 24	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 25	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 26	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 27	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 28	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 29	CAP-5.5-18PF 350V NPO V MT CER TRMR	1001-0008	ERIE	CV31A180
	DIODE			
CR 1	DIO-HP2800 SI HOT CARR AIN 2PF 70PRV	1283-0001	HP	5082-2800
CR 2	DIO-HP2800 SI HOT CARR AIN 2PF 70PRV	1283-0001	HP	5082-2800
	FILTER			
FL1	FLTR-CER 10.7 MHZ 3DB BW 280 KHZ	1040-0043	MURATA CORP.	10.70MHZ RED ONLY
	INDUCTOR			
L 1	CH-2.7UH 10% RF MLD AXL .10DX.25L	1585-0079	DELEVAN	1025-30
L 2	ASSY-COIL AIR CORE	1596-0076		
L 3	COIL ASSY-5/6/5 TURN	1596-0223		
L 6	ASSY-COIL AIR CORE	1596-0076		
L 7	COIL-AIR CORE .209 DIA 22GA IT	1596-0232		
L 8	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 9	CH-.68UH 10% RF MLD AXL .16DX.38L	1585-0024	DELEVAN	1537-08
L 10	ASSY-COIL .064 UH RF	1596-5802		
L 11	CH-2.7UH 10% RF MLD AXL .10DX.25L	1585-0079	DELEVAN	1025-30
L 12	ASSY-COIL-AIR CORE	1596-0072		

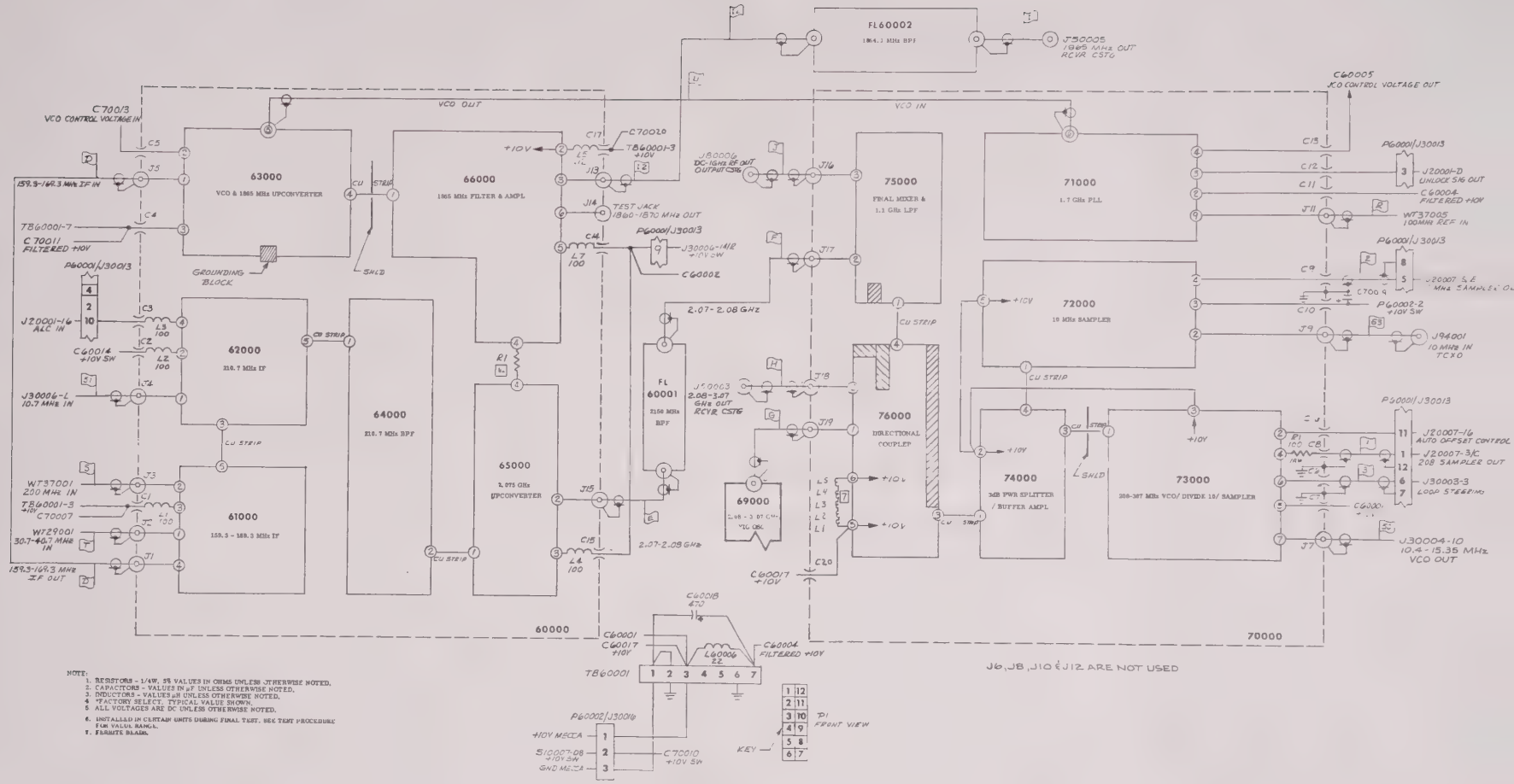
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	TRANSISTOR			
Q 1	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 2	XSTR-NE73435 NPN SI	1272-0087	NIPPON ELEC	NE73435
Q 3	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 4	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 5	XSTR-2N4126 PNP SI T092 LOW PWR	1272-0090	FAIRCHILD	2N4126
Q 6	XSTR-NE73435 NPN SI	1272-0087	NIPPON ELEC	NE73435
	RESISTOR			
R 1	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 2	RES-13K 5% 1/8W CC	1065-1335	ALLEN BRADLEY	BB1335
R 3	RES-3.3K 5% 1/8W CC	1065-3325	ALLEN BRADLEY	BB3325
R 4	RES-39 OHM 5% 1/8W CC	1065-3905	ALLEN BRADLEY	BB3905
R 5	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 6	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 7	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 8	RES-18K 5% 1/8W CC	1065-1835	ALLEN BRADLEY	BB1835
R 9	RES-360 OHM 5% 1/8W CC	1065-3615	ALLEN BRADLEY	BB3615
R 10	RES-3.3K 5% 1/8W CC	1065-3325	ALLEN BRADLEY	BB3325
R 11	RES-360 OHM 5% 1/8W CC	1065-3615	ALLEN BRADLEY	BB3615
R 12	RES-3.9K 5% 1/8W CC	1065-3925	ALLEN BRADLEY	BB3925
R 13	RES-360 OHM 5% 1/8W CC	1065-3615	ALLEN BRADLEY	BB3615
R 14	RES-39 OHM 5% 1/8W CC	1065-3905	ALLEN BRADLEY	BB3905
R 15	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 16	RES-39 OHM 5% 1/8W CC	1065-3905	ALLEN BRADLEY	BB3905
R 17	RES-12K 5% 1/8W CC	1065-1235	ALLEN BRADLEY	BB1235
R 18	RES-51K 5% 1/8W CC	1065-5135	ALLEN BRADLEY	BB5135
R 19	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 20	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
	TRANSFORMER			
T 1	XFMR-TOROIDIAL BIFILAR	1579-0042		
	MIXER			
Z 1	MXR-SBL-1 DBL BAL 1-500MHZ	2010-0009	MINI-CIRCUITS LAB	SBL-1



6. L* = MICROSTRIP INDUCTORS (ETCHED)
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

NOTE:

Figure 6-63. 53000 2nd Converter.



NOTE:
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
6. INSTALLED IN CERTAIN UNITS DURING FINAL TEST. SEE TEST PROCEDURE FOR VALUE RANGE.
7. FERRITE BEADS.

Figure 6-64. 60000/70000 RF Main Casting.

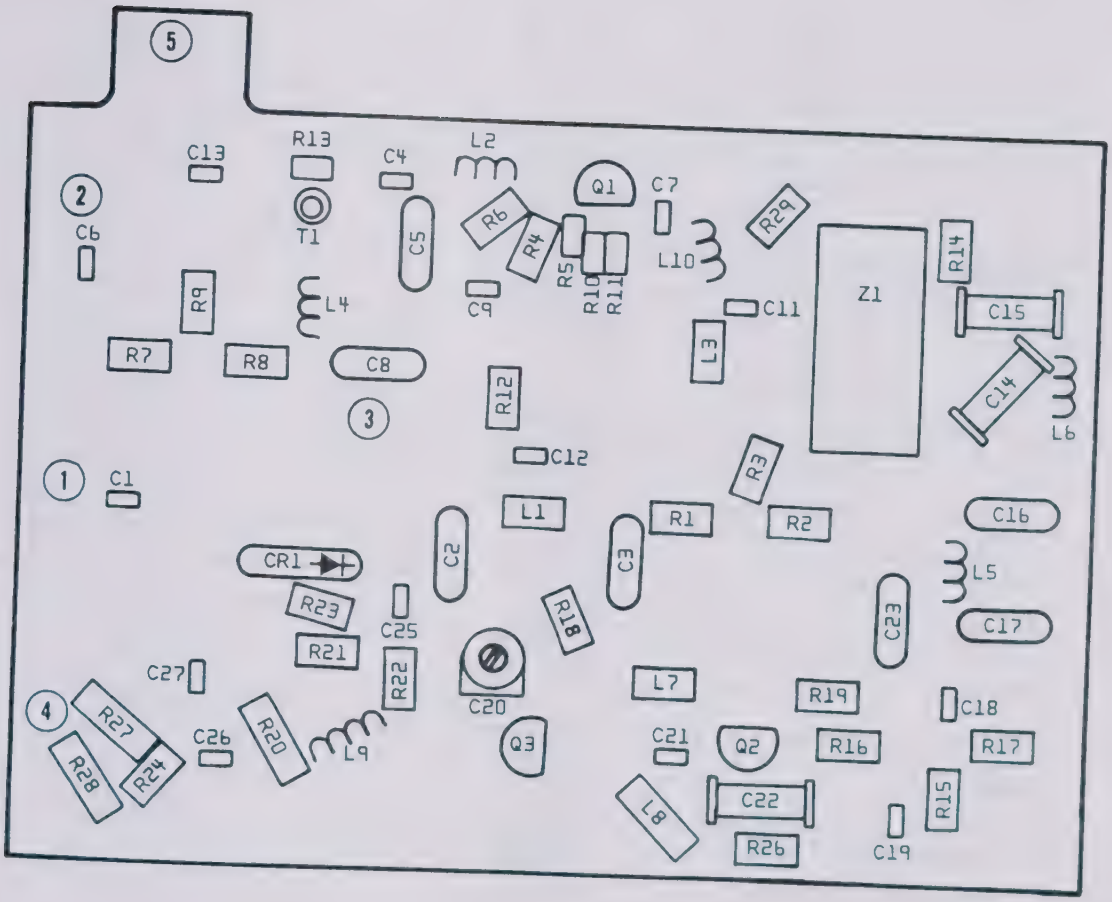
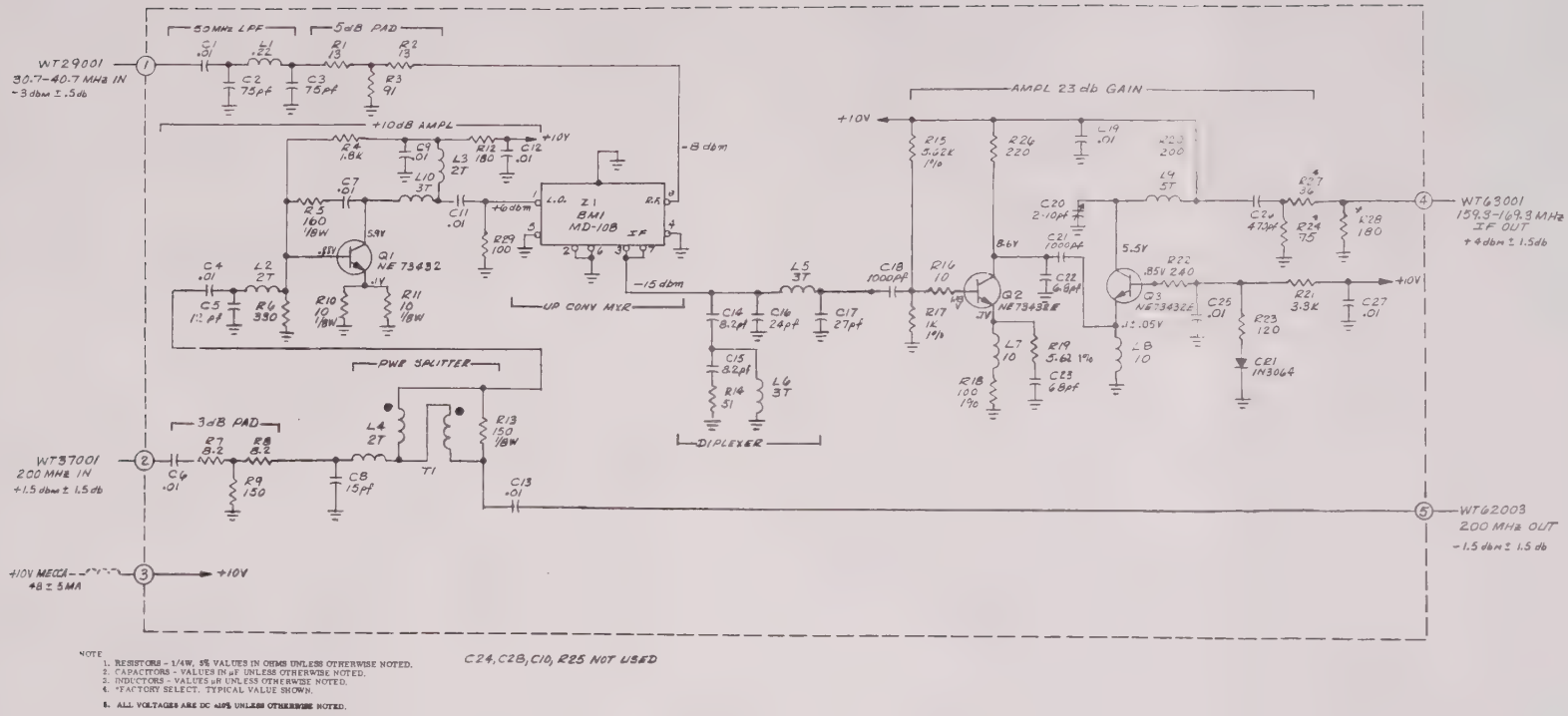


Figure 6-65. 61000 159.3-169.3 MHz IF, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
61000	PCB ASSY - 159.3-169.3 MHz IF	7001-0468	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1021	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-75PF 5% 500V DIP MICA	1002-0025	ELMENCO	DM15-E-750J
C 3	CAP-75PF 5% 500V DIP MICA	1002-0025	ELMENCO	DM15-E-750J
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-12PF 5% 500V DIP MICA	1002-0017	ELMENCO	DM15-C-120J
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-15PF 5% 500V DIP MICA	1002-0001	ELMENCO	DM15-C-150J
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-8.2PF .25PF 500V NPO CER TUB	1005-0043	TUSONIX	301-000-C0H0-829C
C 15	CAP-8.2PF .25PF 500V NPO CER TUB	1005-0043	TUSONIX	301-000-C0H0-829C
C 16	CAP-24PF 5% 500V DIP MICA	1002-0051	ELMENCO	DM15-C-240J
C 17	CAP-27PF 5% 500V DIP MICA	1002-0008	ELMENCO	DM15-E-270J
C 18	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 19	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 20	CAP-2.8-10PF 250V V ADJ CER TRMR	1001-0021	SPRAGUE	GRU10000
C 21	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 22	CAP-6.8PF .25PF 500V NPO CER TUB	1005-0006	TUSONIX	301-000-C0H0-689C
C 23	CAP-68PF 5% 500V DIP MICA	1002-0013	ELMENCO	DM15-E-680J
C 25	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 26	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 27	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	INDUCTOR			
L 1	CH-.22UH 10% RF MLD AXL .10DX.25L	1585-0075	DELEVAN	1025-04
L 2	COIL-AIR CORE .090 DIA-22GA-2T	1596-0268		
L 3	ASSY-COIL-AIR CORE	1596-0070		
L 4	COIL-AIR CORE .136 DIA/24GA/2T	1596-0278		
L 5	COIL-AIR CORE .136 DIA/26GA/3T	1596-0279		
L 6	COIL-AIR CORE .090 DIA/26GA/3T	1596-0277		
L 7	CH-10UH 10% RF MLD AXL .10DX.25L	1585-0064	DELEVAN	1025-44
L 8	CH-10UH 10% RF MLD AXL .10DX.25L	1585-0064	DELEVAN	1025-44
L 9	COIL NYL CORE 1/4-20/20GA/5T	1596-0295		
L 10	COIL-AIR CORE .136 DIA/22GA/3T	1596-0273		
	TRANSISTOR			
Q 1	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z
Q 2	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z
Q 3	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z
	RESISTOR			
R 1	RES-13 OHM 5% 1/4W CC	1066-1305	ALLEN BRADLEY	CB1305
R 2	RES-13 OHM 5% 1/4W CC	1066-1305	ALLEN BRADLEY	CB1305
R 3	RES-91 OHM 5% 1/4W CC	1066-9105	ALLEN BRADLEY	CB 9105
R 4	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 5	RES-160 OHM 5% 1/8W CC	1065-1615	ALLEN BRADLEY	BB1615

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 6	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 7	RES-8.2 OHM 5% 1/4W CC	1066-0005	ALLEN BRADLEY	CB82G5
R 8	RES-8.2 OHM 5% 1/4W CC	1066-0005	ALLEN BRADLEY	CB82G5
R 9	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 10	RES-10 OHM 5% 1/8 CC	1065-1005	ALLEN BRADLEY	BB1005
R 11	RES-10 OHM 5% 1/8 CC	1065-1005	ALLEN BRADLEY	BB1005
R 12	RES-180 OHM 5% 1/4W CC	1066-1815	ALLEN BRADLEY	CB1815
R 13	RES-150 OHM 5% 1/8W CC	1065-1515	ALLEN BRADLEY	BB1515
R 14	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 15	RES-5.62K 1% 100PPM FILM	1075-0013	CAT.LIST	55-100
R 16	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 17	RES-1K 1% 100PPM FILM	1075-0037	CAT.LIST	55-100
R 18	RES-100 OHM 1% 150PPM FILM	1074-1033	CAT.LIST	55-100
R 19	RES-5.62 OHM 1% 100 PPM FILM	1075-0199	SOURCE APPROVAL LIST	CAT. 55-100
R 20	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 21	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 22	RES-240 OHM 5% 1/4W CC	1066-2415	ALLEN BRADLEY	CB2415
R 23	RES-120 OHM 5% 1/4W CC	1066-1215	ALLEN BRADLEY	CB1215
R 24	RES-75 OHM 5% 1/4W CC	1066-7505	ALLEN BRADLEY	CB 7505
R 26	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 27	RES-36 OHM 5% 1/4W CC	1066-3605	ALLEN BRADLEY	CB3605
R 28	RES-180 OHM 5% 1/4W CC	1066-1815	ALLEN BRADLEY	CB1815
R 29	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
	TRANSFORMER			
T 1	XFMR-TOROIDIAL BIFILAR	1579-0042		
	MIXER			
Z 1	MXR-SBL-1 DBL BAL 1-500MHZ	2010-0009	MINI-CIRCUITS LAB	SBL-1



NOTE
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC ±10% UNLESS OTHERWISE NOTED.

C24, C28, C10, R25 NOT USED

Figure 6-66. 61000 159.3-169.3 MHz IF.

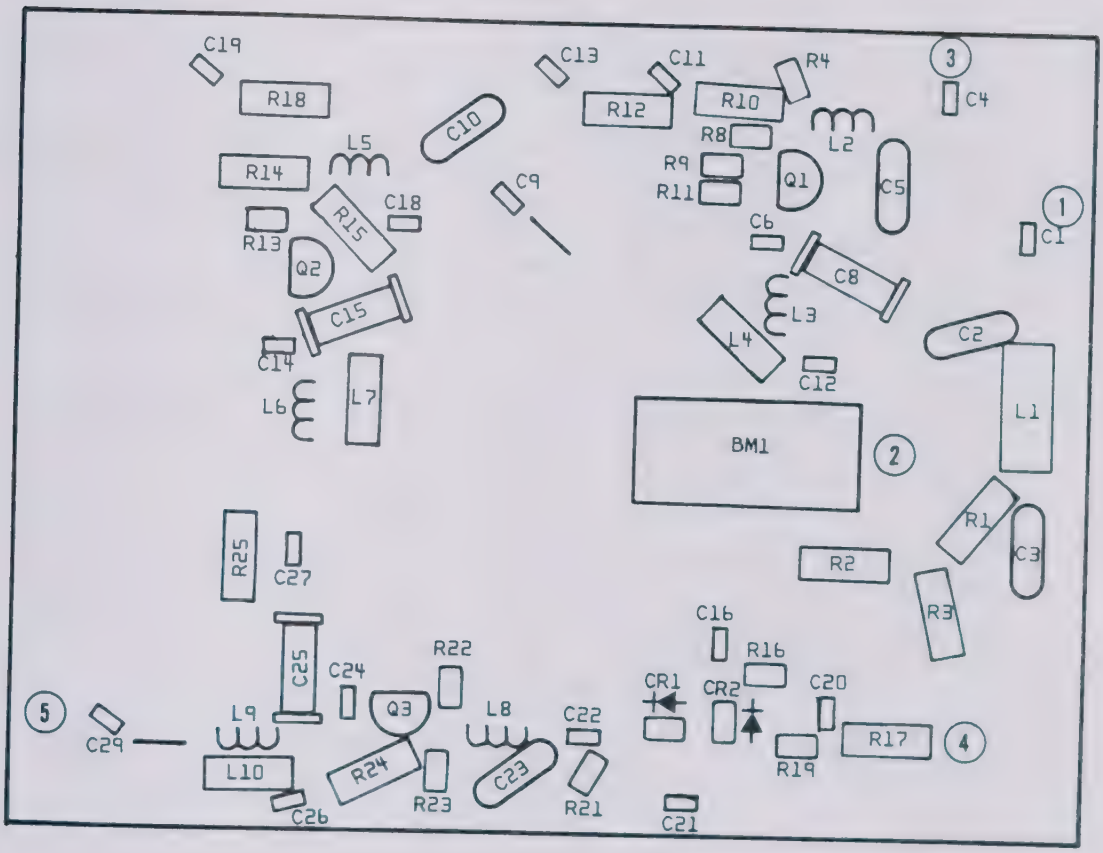


Figure 6-67. 62000 210.7 MHz IF, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
62000	PCB ASSY - 210.7 MHz IF	7001-0469	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1020	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-430PF 5% 500V DIP MICA	1002-0034		
C 3	CAP-430PF 5% 500V DIP MICA	1002-0034		
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-12PF 5% 500V DIP MICA	1002-0017	ELMENCO	DM15-C-120J
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-6.8PF .25PF 500V NPO CER TUB	1005-0006	TUSONIX	301-000-C0H0-689C
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-10PF 5% 500V DIP MICA	1002-0016	ELMENCO	DM15-C-100J
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 15	CAP-8.2PF .25PF 500V NPO CER TUB	1005-0043	TUSONIX	301-000-C0H0-829C
C 16	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 19	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 20	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 21	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 22	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 23	CAP-10PF 5% 500V DIP MICA	1002-0016	ELMENCO	DM15-C-100J
C 24	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 25	CAP-8.2PF .25PF 500V NPO CER TUB	1005-0043	TUSONIX	301-000-C0H0-829C
C 26	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 27	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 29	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
	DIODE			
CR 1	DIO-1N5767 SI PIN A1AH	1281-0075	NIPPON ELECT	1SV34
CR 2	DIO-1N5767 SI PIN A1AH	1281-0075	NIPPON ELECT	1SV34
	INDUCTOR			
L 1	CH-.68UH 10% RF MLD AXL .16DX.38L	1585-0024	DELEVAN	1537-08
L 2	COIL-AIR CORE .090 DIA-22GA-2T	1596-0268		
L 3	COIL-AIR CORE .136 DIA/22GA/3T	1596-0273		
L 4	CH-.56UH 10% RF MLD AXL .10DX.25L	1585-0076	DELEVAN	1025-14
L 5	COIL-AIR CORE .090 DIA-22GA-2T	1596-0268		
L 6	COIL-AIR CORE .136 DIA/22GA/3T	1596-0273		
L 7	CH-.56UH 10% RF MLD AXL .10DX.25L	1585-0076	DELEVAN	1025-14
L 8	COIL-AIR CORE .090 DIA-22GA-2T	1596-0268		
L 9	COIL-AIR CORE .136 DIA/22GA/3T	1596-0273		
L 10	CH-.56UH 10% RF MLD AXL .10DX.25L	1585-0076	DELEVAN	1025-14
	TRANSISTOR			
Q 1	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z
Q 2	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z
Q 3	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	RESISTOR			
R 1	RES-16 OHM 5% 1/4W CC	1066-1605	ALLEN BRADLEY	CB1605
R 2	RES-16 OHM 5% 1/4W CC	1066-1605	ALLEN BRADLEY	CB1605
R 3	RES-68 OHM 5% 1/4W CC	1066-6805	ALLEN BRADLEY	CB 6805
R 4	RES-330 OHM 5% 1/8W CC	1065-3315	ALLEN BRADLEY	BB3315
R 8	RES-330 OHM 5% 1/8W CC	1065-3315	ALLEN BRADLEY	BB3315
R 9	RES-10 OHM 5% 1/8 CC	1065-1005	ALLEN BRADLEY	BB1005
R 10	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 11	RES-10 OHM 5% 1/8 CC	1065-1005	ALLEN BRADLEY	BB1005
R 12	RES-180 OHM 5% 1/4W CC	1066-1815	ALLEN BRADLEY	CB1815
R 13	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 14	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 15	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 16	RES-130 OHM 5% 1/8W CC	1065-1315	ALLEN BRADLEY	BB1315
R 17	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215
R 18	RES-180 OHM 5% 1/4W CC	1066-1815	ALLEN BRADLEY	CB1815
R 19	RES-220 OHM 5% 1/8W CC	1065-2215		
R 21	RES-130 OHM 5% 1/8W CC	1065-1315	ALLEN BRADLEY	BB1315
R 22	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 23	RES-470 OHM 5% 1/8W CC	1065-4715	ALLEN BRADLEY	BB4715
R 24	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 25	RES-180 OHM 5% 1/4W CC	1066-1815	ALLEN BRADLEY	CB1815
	MIXER			
Z 1	MXR-SBL-1 DBL BAL 1-500MHZ	2010-0009	MINI-CIRCUITS LAB	SBL-1

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR NO
	RESISTOR			
R 1	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 2	RES-68 OHM 5% 1/8W CC	1065-6805	ALLEN BRADLEY	RC05GF680J
R 3	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 4	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 5	RES-1.3K 5% 5% 1/8W CC	1065-1325	ALLEN BRADLEY	BB1325
R 6	RES-7.5K 5% 1/8W CC	1065-7525	ALLEN BRADLEY	BB7525
R 7	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 8	RES-270 OHM 5% 1/8W CC	1065-2715	ALLEN BRADLEY	BB2715
R 9	RES-220 OHM 5% 1/8W CC	1065-2215		
R 10	RES-18 OHM 5% 1/8W CC	1065-1805	ALLEN BRADLEY	BB1805
R 11	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 12	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 13	RES-27K 5% 1/8W CC	1065-2735	ALLEN BRADLEY	BB2735
R 14	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 15	RES-18 OHM 5% 1/8W CC	1065-1805	ALLEN BRADLEY	BB1805
R 16	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 17	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 18	RES-68 OHM 5% 1/8W CC	1065-6805	ALLEN BRADLEY	RC05GF680J
R 19	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 20	RES-68 OHM 5% 1/8W CC	1065-6805	ALLEN BRADLEY	RC05GF680J
R 21	RES-18 OHM 5% 1/8W CC	1065-1805	ALLEN BRADLEY	BB1805
R 22	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 23	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
	TRANSFORMER			
T 1	XFMR-TOROIDAL 2/36GA/4T	1579-0052	CUSHMAN	C/E DWG & M/L

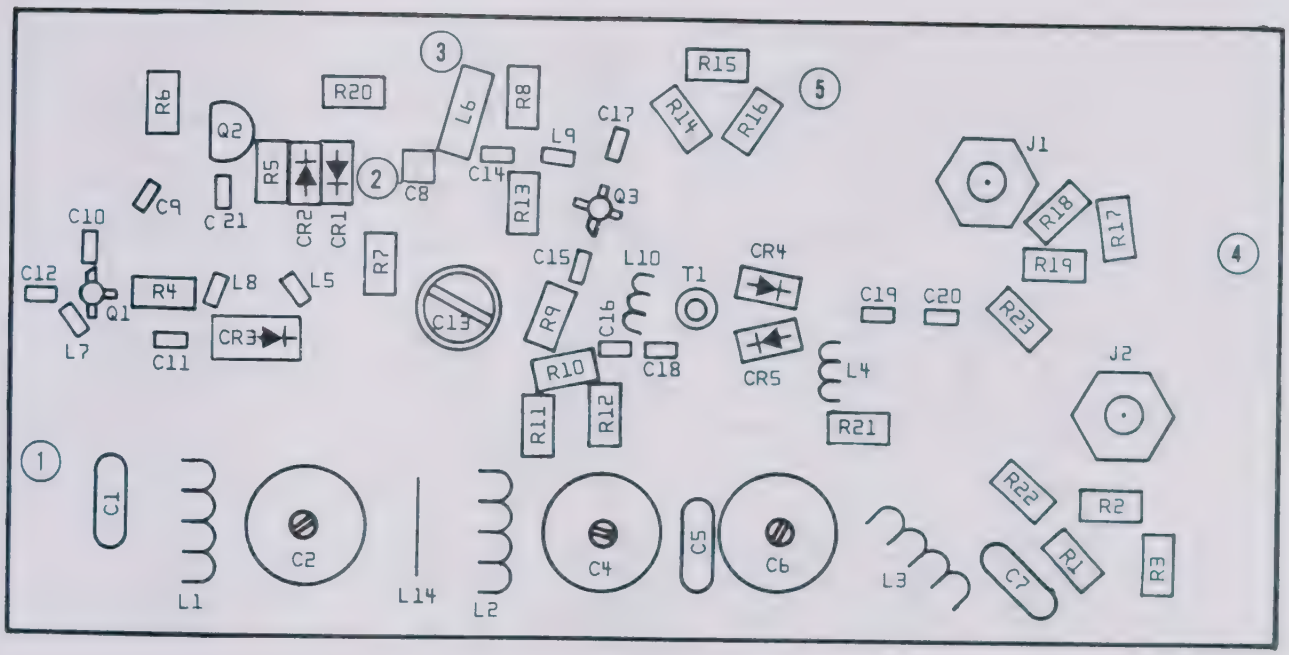
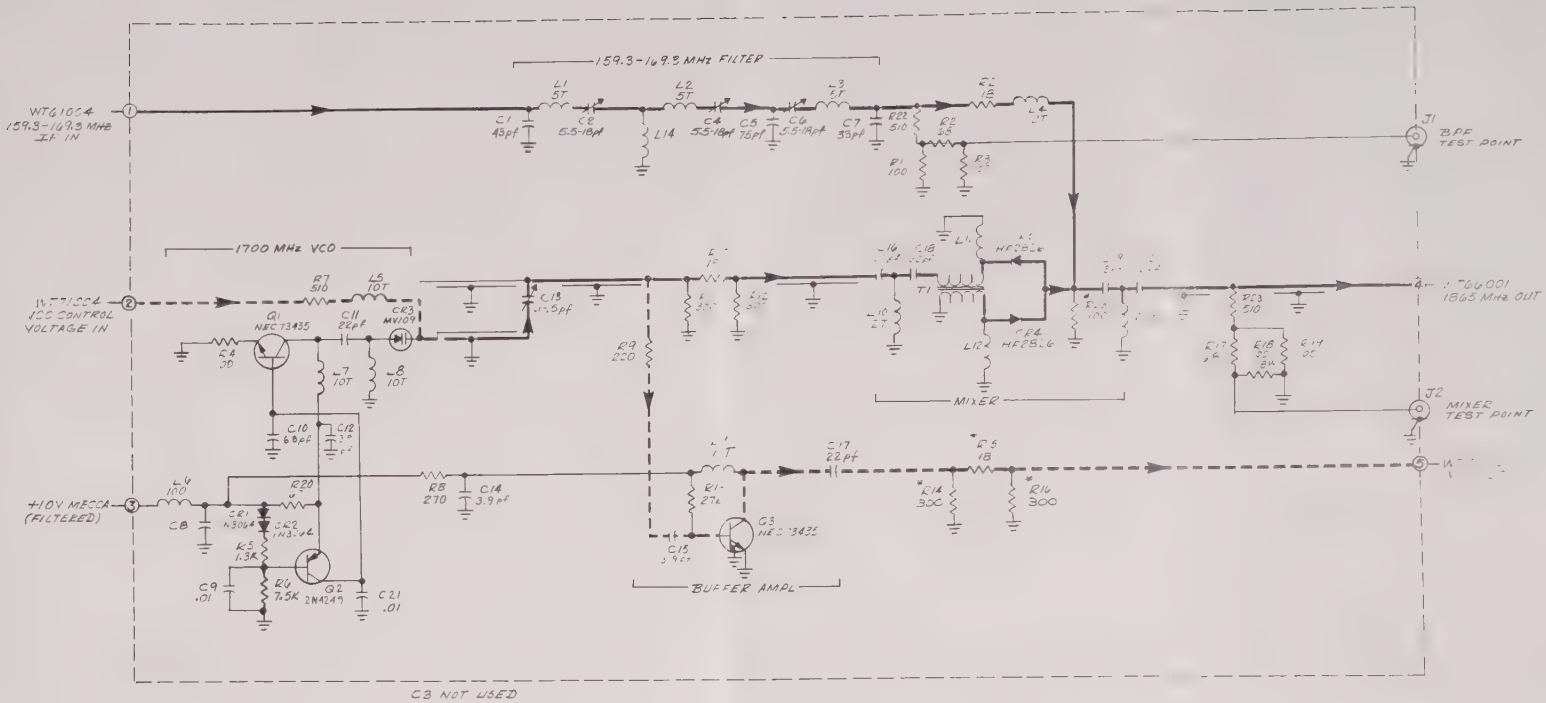


Figure 6-69 63000 1.2 GHz VCO and 1865 MHz Up Converter, Component Location.

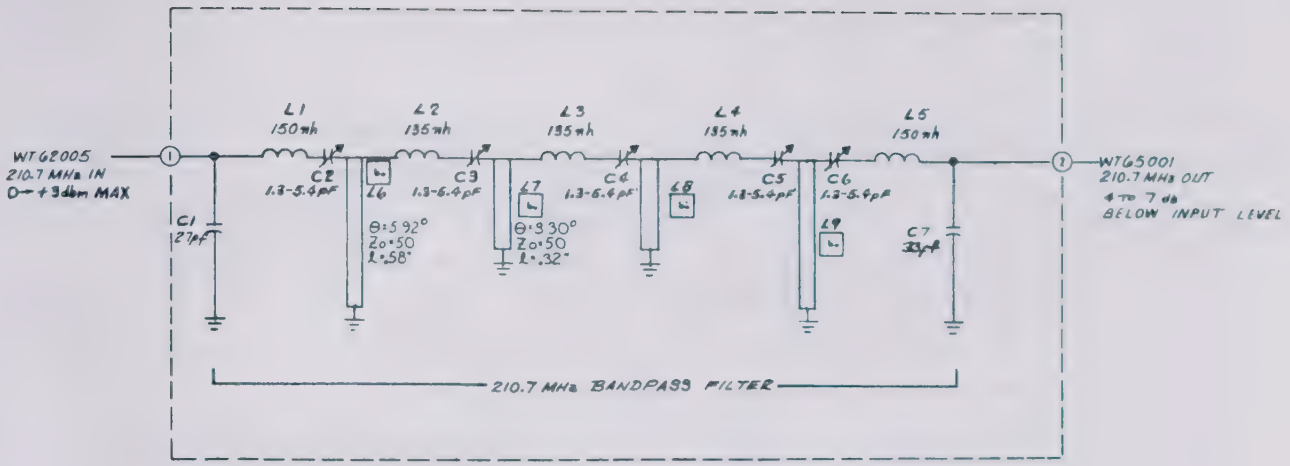
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
63000	PCB ASSY - VCO & 1875 MHz UPCONV	7001-0470	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1022	CUSHMAN	
	CAPACITOR			
C 1	CAP-43PF 5% 500V DIP MICA	1002-0046	SANGAMO	D155E430
C 2	CAP-5.5-18PF 350V NPO V MT CER TRMR	1001-0008	ERIE	CV31A180
C 4	CAP-5.5-18PF 350V NPO V MT CER TRMR	1001-0008	ERIE	CV31A180
C 5	CAP-75PF 5% 500V DIP MICA	1002-0025	ELMENCO	DM15-E-750J
C 6	CAP-5.5-18PF 350V NPO V MT CER TRMR	1001-0008	ERIE	CV31A180
C 7	CAP-33PF 5% 500V DIP MICA	1002-0024	ELMENCO	DM15-E-220J
C 8	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-6.8PF .5PF 50V NPO CHIP	1012-0012	VARADYNE	30BN050S6R8CS
C 11	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 12	CAP-3.9PF .5PF 50V NPO CHIP	1012-0022	JOHANSON	50R15Q-3R9DP
C 13	PL-SINGLE SIDED CAP	2245-0043	CUSHMAN	C/E DWG
C 14	CAP-3.9PF .5PF 50V NPO CHIP	1012-0022	JOHANSON	50R15Q-3R9DP
C 15	CAP-3.9PF .5PF 50V NPO CHIP	1012-0022	JOHANSON	50R15Q-3R9DP
C 16	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 17	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 18	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 19	CAP-12PF 5% 50V NPO CHIP	1012-0005	VARADYNE	3BN050S120JS
C 20	CAP-12PF 5% 50V NPO CHIP	1012-0005	VARADYNE	3BN050S120JS
C 21	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 22	CAP-10UF 20% 35V RDL ELCTLT	1013-0044	NICHICON	35UKB10M
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
CR 4	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
CR 5	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
	CONNECTOR			
J 1	CONN-SMB 50 OHM STR JK PC MT SNAP-ON	2536-0071	SEALECTRO	51-051-0000
J 2	CONN-SMB 50 OHM STR JK PC MT SNAP-ON	2536-0071	SEALECTRO	51-051-0000
	INDUCTOR			
L 1	COIL-AIR CORE .172 DIA/18GA/5T	1596-0276		
L 2	COIL-AIR CORE .172 DIA/18GA/5T	1596-0276		
L 3	COIL-AIR CORE .172 DIA/18GA/5T	1596-0276		
L 4	COIL-AIR CORE .090 DIA-22GA-2T	1596-0268		
L 5	COIL-SLVG CORE .050 DIA/36GA/10T	1596-0288		
L 6	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 7	COIL-SLVG CORE .050 DIA/36GA/10T	1596-0288		
L 8	COIL-SLVG CORE .050 DIA/36GA/10T	1596-0288		
L 9	COIL-SLVG CORE .050 DIA/36GA/10T	1596-0288		
L 10	COIL-AIR CORE .090 DIA-22GA-2T	1596-0268		
	TRANSISTOR			
Q 1	XSTR-NE73435 NPN SI	1272-0087	NIPPON ELEC	NE73435
Q 2	XSTR-2N4249 PNP SI R124B LOW PWR	1272-0024	CARTER SEMI	2N4249
Q 3	XSTR-NE73435 NPN SI	1272-0087	NIPPON ELEC	NE73435



NOTES:

1. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
2. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
5. RESISTORS - 1/8W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-70. 63000 1.2 GHz VCO and 1865 MHz Up Converter.



NOTE:

1. RESISTORS - 1/8W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.

L6-L9 STRIP LINE INDUCTORS.

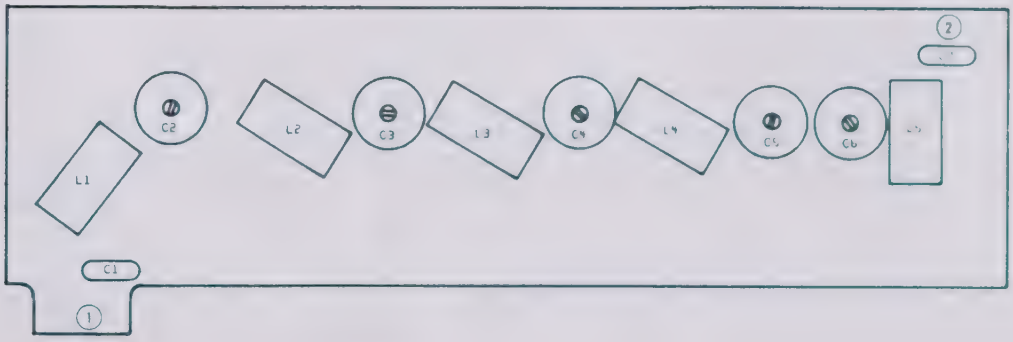
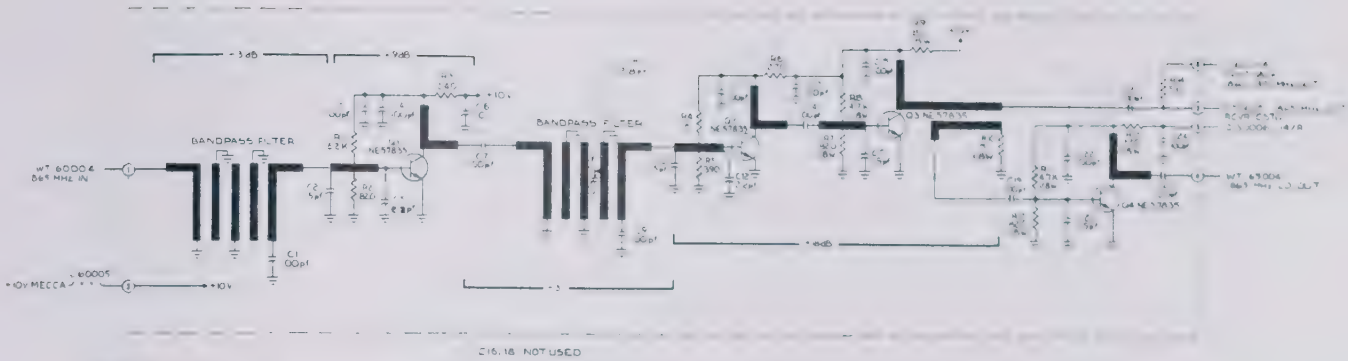


Figure 6-71. 64000 210.7 MHz BPF.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
65000	PCB ASSY - 2.075 GHz UPCONVERTER	7001-0472	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1026	CUSHMAN	
	CAPACITOR			
C 1	CAP-2.7PF .25PF 50V NPO CHIP	1012-0032	NOR CAL ASSOC	3BP050S2R7C S
C 2	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 3	CAP-2.7PF .25PF 50V NPO CHIP	1012-0032	NOR CAL ASSOC	3BP050S2R7C S
C 4	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 5	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 6	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-1.3PF .25PF 50V NPO CHIP	1012-0034	JOHANSON	500 R16N143CB
C 10	CAP-10PF 10% 100V NPO MINTR CER	1005-0074	TUSONIX	8101-100-C0G0-100K
C 11	CAP-10PF 10% 100V NPO MINTR CER	1005-0074	TUSONIX	8101-100-C0G0-100K
	DIODE			
CR 1	DIO-HP2811 SI HOT CARR AIN 1.2PF 15PRV	1283-0004	HP	5082-2811
CR 3	DIO-HP2811 SI HOT CARR AIN 1.2PF 15PRV	1283-0004	HP	5082-2811
	TRANSISTOR			
Q 1	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 2	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
	RESISTOR			
R 1	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 2	RES-18 OHM 5% 1/8W CC	1065-1805	ALLEN BRADLEY	BB1805
R 3	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 4	RES-13 OHM 5% 1/8W CC	1065-1305	ALLEN BRADLEY	BB1305
R 5	RES-4.7K 5% 1/8W CC	1065-4725	ALLEN BRADLEY	BB4725
R 6	RES-5.1K 5% 1/8W CC	1065-5125	ALLEN BRADLEY	BB5125
R 7	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2025
R 8	RES-18 OHM 5% 1/8W CC	1065-1805	ALLEN BRADLEY	BB1805
R 9	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 10	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 11	RES-27 OHM 5% 1/8W CC	1065-2705	ALLEN BRADLEY	BB2705
R 12	RES-11K 5% 1/8W CC	1065-1135	ALLAN BRADLEY	BB 1135
R 13	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2025
R 14	RES-4.7K 5% 1/8W CC	1065-4725	ALLEN BRADLEY	BB4725



NOTE:
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.

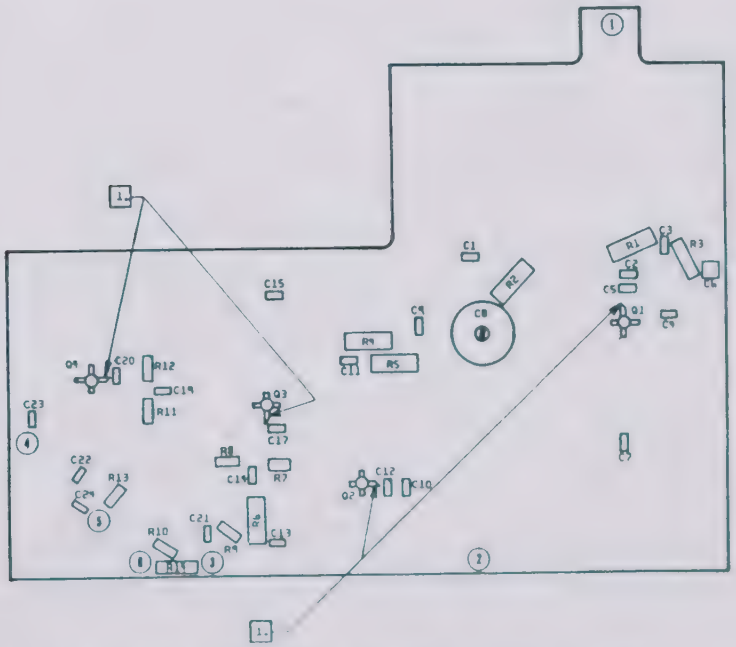


Figure 6-73. 66000 1865 MHz Filter and Amplifier.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
66000	PCB ASSY - 1865 MHZ FILTER & AMP	7001-0599	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1079	CUSHMAN	
	CAPACITOR			
C 1	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 2	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 3	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 4	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 5	CAP-2.2PF .5PF 50V NPO CHIP	1012-0003	KEMET	C0805C229D5GHH
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 8	CAP-2-8PF 350V NPO V MT CER TRMR	1001-0004	TUSONIX	538-011A2-8
C 9	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 10	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 11	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 12	CAP-2.2PF .5PF 50V NPO CHIP	1012-0003	KEMET	C0805C229D5GHH
C 13	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 14	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 15	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 17	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 19	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 20	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 21	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 22	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 23	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 24	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
	TRANSISTOR			
Q 1	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 2	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 3	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 4	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
	RESISTOR			
R 1	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 2	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215
R 3	RES-240 OHM 5% 1/4W CC	1066-2415	ALLEN BRADLEY	CB2415
R 4	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 5	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 6	RES-270 OHM 5% 1/4W CC	1066-2715	ALLEN BRADLEY	CB2715
R 7	RES-820 OHM 5% 1/8 CC	1065-8215	ALLEN BRADLEY	BB8215
R 8	RES-4.7K 5% 1/8W CC	1065-4725	ALLEN BRADLEY	BB4725
R 9	RES-180 OHM 5% 1/8W CC	1065-1815	ALLEN BRADLEY	BB1815
R 10	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 11	RES-4.7K 5% 1/8W CC	1065-4725	ALLEN BRADLEY	BB4725
R 12	RES-820 OHM 5% 1/8 CC	1065-8215	ALLEN BRADLEY	BB8215
R 13	RES-220 OHM 5% 1/8W CC	1065-2215		
R 14	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115

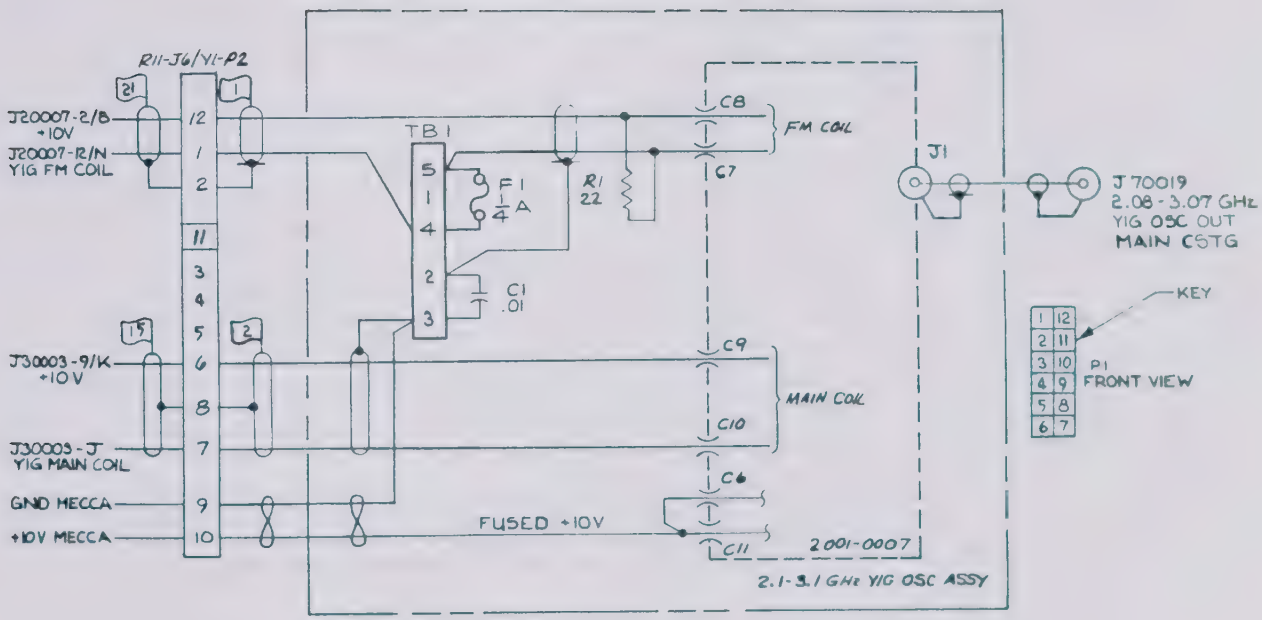


Figure 6-74. 69000 YIG Interconnect.

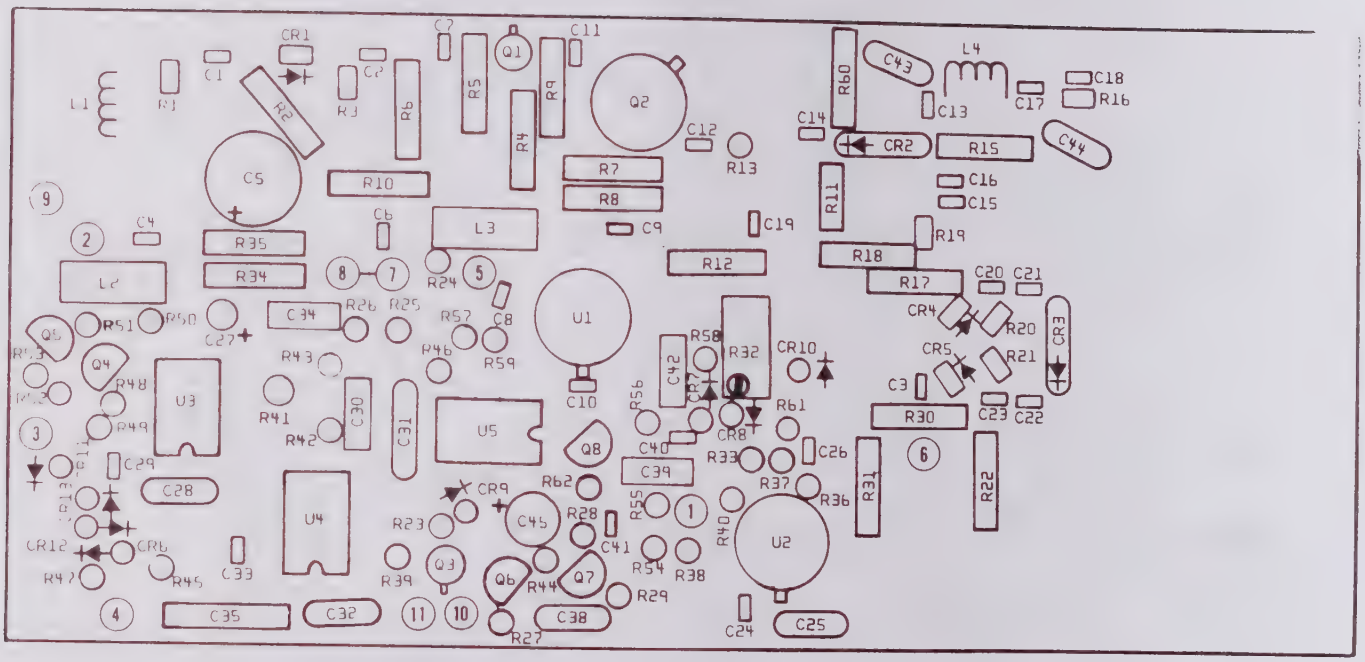
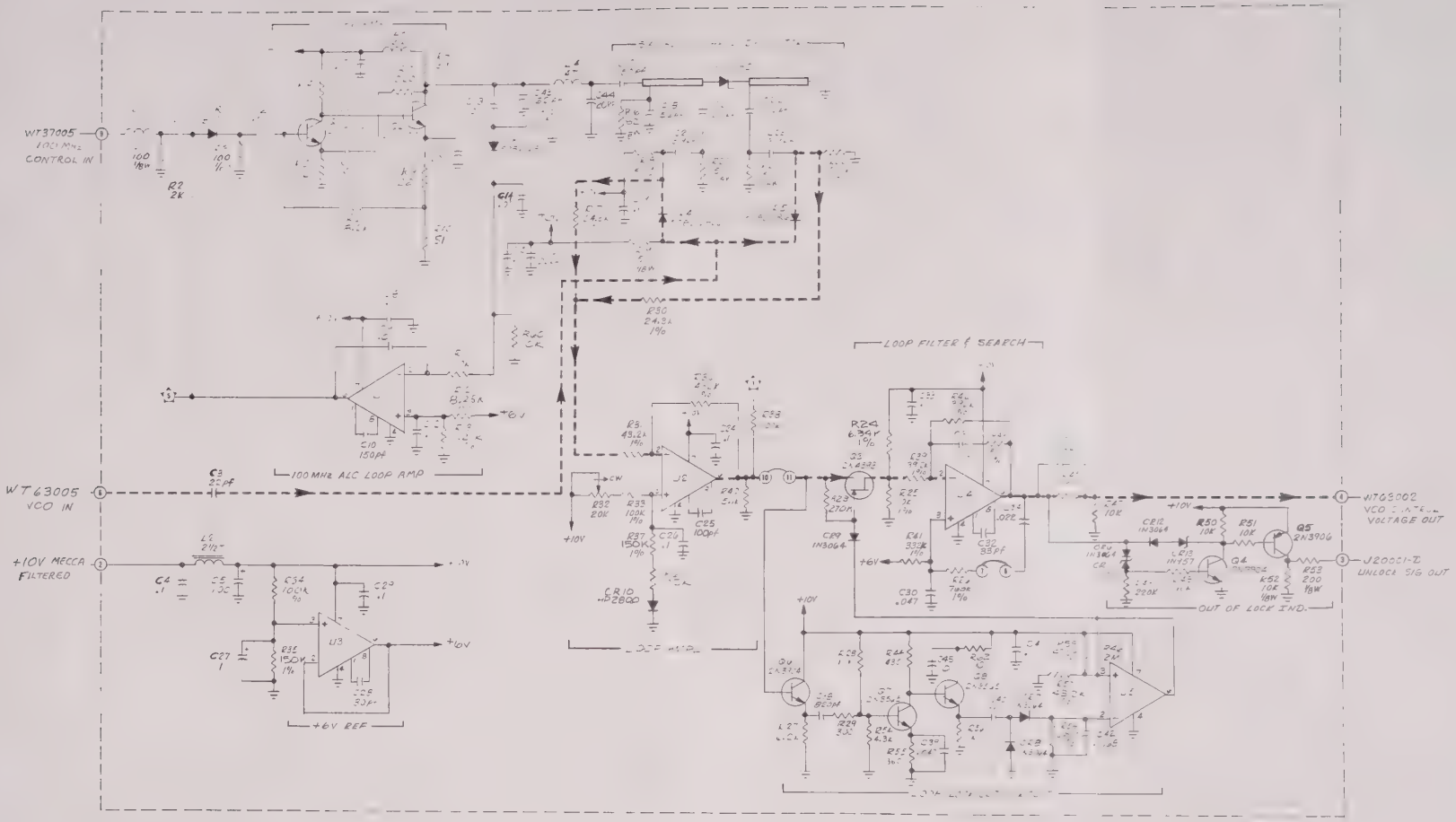


Figure 6-75. 71000 1.7 GHz PLL, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR NO
71000	PCB ASSY - 1.7 GHz PLL	7001-0474	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1027	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 3	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 4	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 5	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-150PF 10% 100V NPO MINTR CER	1005-0108	ERIE	8121-100-C0G0-151K
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 13	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 14	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 15	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 16	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 17	CAP-150PF 10% 100V NPO MINTR CER	1005-0108	ERIE	8121-100-C0G0-151K
C 18	CAP-56PF 10% 100V NPO MINTR CER	1005-0109	TUSONIX	8121-100-C0G0-560K
C 19	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 20	CAP-3.9PF .5PF 50V NPO CHIP	1012-0022	JOHANSON	50R15Q-3R9DP
C 21	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 22	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 23	CAP-3.9PF .5PF 50V NPO CHIP	1012-0022	JOHANSON	50R15Q-3R9DP
C 24	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 25	CAP-100PF 2% 500V DIP MICA	1002-0050	ELMENCO	DM15-F-101G
C 26	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 27	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 28	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 29	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 30	CAP-.047UF 10% 100V MLD CER	1005-0055	AEROVOX	CK06BX473K
C 31	CAP-.027UF 10% 100V RDL POLYESTER	1008-0032	SPRAGUE	225P27391WA3
C 32	CAP-33PF 5% 500V DIP MICA	1002-0024	ELMENCO	DM15-E-220J
C 33	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 34	CAP-.022UF 10% 100V MLD CER	1005-0079	AEROVOX	CK06BX223K
C 35	CAP-.022UF 5% 400V RDL POLYESTER	1008-0094	PLESSEY CAP.	60C223J400
C 38	CAP-820PF 5% 300V DIP MICA	1002-0039	ELMENCO	DM15-F-821J
C 39	CAP-.047UF 10% 100V MLD CER	1005-0055	AEROVOX	CK06BX473K
C 40	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 41	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 42	CAP-6800PF 10% 200V MLD CER	1005-0099	AEROVOX	CK06BX682K
C 43	CAP-62PF 5% 500V DIP MICA	1002-0057		
C 44	CAP-20PF 5% 500V DIP MICA	1002-0060	ELMENCO	DM15-E-200J
C 45	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP	10PC25
	DIODE			
CR 1	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 2	DIO-HP2800 SI HOT CARR A1N 2PF 70PRV	1283-0001	HP	5082-2800
CR 3	DIO-HP0180 SI STEP RCVY D07 4.6PF 50V	1282-0008	HP	5082-018
CR 4	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-282
CR 5	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-282
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N306
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N306
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N306

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 10	DIO-HP2800 SI HOT CARR A1N 2PF 70PRV	1283-0001	HP	5082-2800
CR 11	DIO-1N957 SI ZENER D07 6.8V 20% .4W	1281-0007	MOTOROLA	1N957
CR 12	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 13	DIO-1N957 SI ZENER D07 6.8V 20% .4W	1281-0007	MOTOROLA	1N957
	INDUCTOR			
L 1	COIL-AIR CORE .130 DIA/24GA/3T	1596-0289		
L 2	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 3	CH-2.2UH 10% RF MLD AXL .16DX.38L	1585-0013	DELEVAN	1537-20
L 4	COIL-AIR CORE .140 DIA/24GA/4T	1596-0300	CUSHMAN	C/E DWG & M/L
	TRANSISTOR			
Q 1	XSTR-2N5179 NPN SI T072 LOW PWR (MOTA)	1272-0060	MOTOROLA	2N5179
Q 2	XSTR-2N5109 NPN SI TO39 HIGH PWR	1272-0110	MOTOROLA	2N5109
Q 3	XSTR-2N4393 SI T018 J-FET N-CHAN	1272-0055	TELEDYNE	2N4393
Q 4	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 5	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 6	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 7	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
Q 8	XSTR-2N3565 NPN SI R110 LOW PWR	1272-0017	FAIRCHILD	2N3565
	RESISTOR			
R 1	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 2	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 3	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 4	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 5	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
R 6	RES-8.2K 5% 1/4W CC	1066-8225	ALLEN BRADLEY	CB 8225
R 7	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 8	RES-39 OHM 5% 1/4W CC	1066-3905	ALLEN BRADLEY	CB 3905
R 9	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
R 10	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 11	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 12	RES-8.25K 1% 100PPM FILM	1075-0014	CAT.LIST	55-100
R 13	RES-1.21K 1% 100PPM FILM	1075-0042	CAT.LIST	55-100
R 15	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 16	RES-82 OHM 5% 1/8W CC	1065-8205	ALLEN BRADLEY	BB8205
R 17	RES-24.3K 1% 100PPM FILM	1075-0097	CAT.LIST	55-100
R 18	RES-200K 1% 100PPM FILM	1075-0148	CAT. LIST	55-100
R 19	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 20	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 21	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 22	RES-301K 1% 150PPM FILM	1074-1037	CAT.LIST	55-100
R 23	RES-270K 5% 1/4W CC	1066-2745	ALLEN BRADLEY	CB2745
R 24	RES-6.34K 1% 150PPM FILM	1074-1007	CAT.LIST	55-100
R 25	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 26	RES-768K 1% 100PPM FILM	1075-0146	CAT. LIST	55-100
R 27	RES-6.2K 5% 1/4W CC	1066-6225	ALLEN BRADLEY	CB 6225
R 28	RES-12K 5% 1/4W CC	1066-1235	ALLEN BRADLEY	CB1235
R 29	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 30	RES-24.3K 1% 100PPM FILM	1075-0097	CAT.LIST	55-100
R 31	RES-43.2K 1% 100PPM FILM	1075-0117		
R 32	POT-20K 10% 1/2W 25T CERMET TRMR	1215-0061	BOURNS	3299Y-1-203
R 33	RES-100K 1% 100PPM FILM	1075-0105	CAT.LIST	55-100
R 34	RES-100K 1% 100PPM FILM	1075-0105	CAT.LIST	55-100
R 35	RES-150K 1% 100PPM FILM	1075-0152	CAT. LIST	55-100

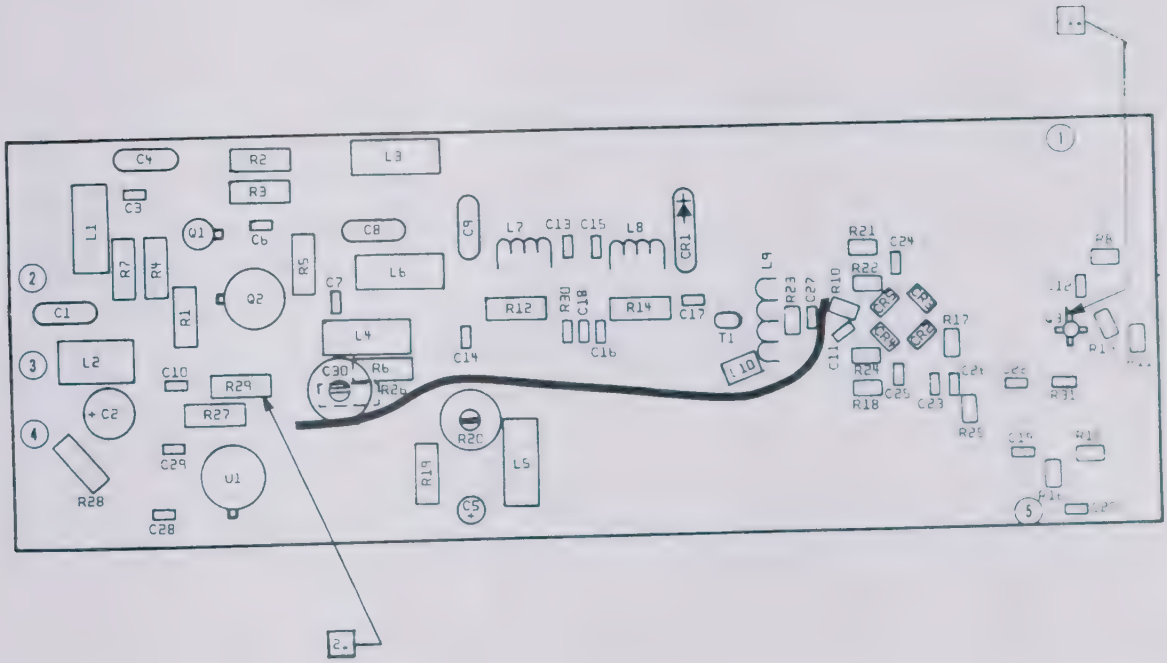
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO
R 36	RES-432K 1% 100PPM FILM	1075-0194		
R 37	RES-150K 1% 100PPM FILM	1075-0152	CAT. LIST	55-100
R 38	RES-100K 5% 1/4W CC	1066-1045	ALLEN BRADLEY	CB1045
R 39	RES-39.2K 1% 25PPM FILM	1074-1032	CAT.LIST	55-025
R 40	RES-5.1K 5% 1/4W CC	1066-5125	ALLEN BRADLEY	CB 5125
R 41	RES-332K 1% 100PPM FILM	1075-0170	SHELLY RODABAUGH	MFF1/8 RN55D
R 42	RES-392K 1% 100PPM FILM	1075-0193		
R 43	RES-511 OHM 1% 150 PPM FILM	1074-1008	CAT.LIST	55-100
R 44	RES-430 OHM 5% 1/4W CC	1066-4315	ALLEN BRADLEY	CB 4315
R 45	RES-910 OHM 5% 1/4W CC	1066-9115	ALLEN BRADLEY	CB 9115
R 46	RES-2MEG 5% 1/4W CC	1066-2055	ALLEN BRADLEY	CB2055
R 47	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 48	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 49	RES-220K 5% 1/4W CC	1066-2245	ALLEN BRADLEY	CB2245
R 50	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 51	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 52	RES-10K 5% 1/8W CC	1065-1035	ALLEN BRADLEY	BB1035
R 53	RES-200 OHM 5% 1/8W CC	1065-2015	ALLEN BRADLEY	BB2015
R 54	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 55	RES-360 OHM 5% 1/4W CC	1066-3615	ALLEN BRADLEY	CB3615
R 56	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 57	RES-43.2K 1% 100PPM FILM	1075-0117		
R 58	RES-6.81K 1% 100PPM FILM	1075-0140	CAT. LIST	55-100
R 59	RES-47.5K 1% 100PPM FILM	1075-0076	CAT.LIST	55-100
R 60	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 61	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 62	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
	INTEGRATED CIRCUIT			
U 1	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 2	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 3	IC-LM308N OP AMPL 8 PIN	2025-0070	NATIONAL	LM308N
U 4	IC-LM308N OP AMPL 8 PIN	2025-0070	NATIONAL	LM308N
U 5	IC-UA741CP	2025-0067	TI	UA741CP



NOTES:
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

C36,C37 & R14 NOT USED

Figure 6-76. 71000 1.7 GHz PLL.



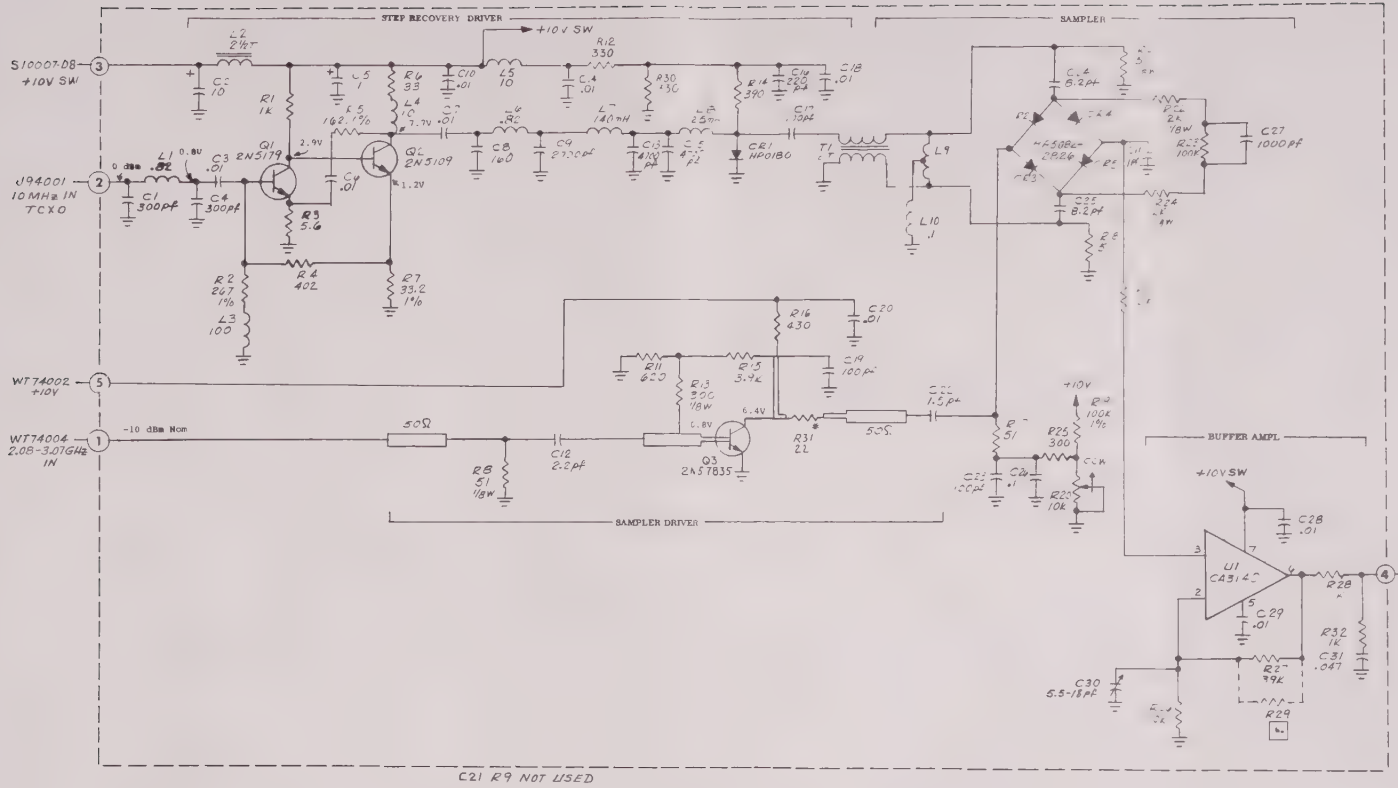
1. BASE LEADS OF Q1, Q2, Q3, and Q4 ARE ANGLE CUT. ORIENT AS SHOWN.

2. INSTALLED IN CERTAIN UNITS DURING FINAL TEST.

Figure 6-77 72000 10 Mhz Sampler, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
72000	PCB ASSY - 10 MHz SAMPLER	7001-0475	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1017	CUSHMAN	
	CAPACITOR			
C 1	CAP-300PF 5% 500V DIP MICA	1002-0059	ELMENCO	DM15-F-301J
C 2	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-300PF 5% 500V DIP MICA	1002-0059	ELMENCO	DM15-F-301J
C 5	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 8	CAP-160PF 5% 500V DIP MICA	1002-0091	ELMENCO	DM15-F-161J
C 9	CAP-2700PF 5% 500V DIP MICA	1002-0081	ELMENCO	DM19-C-272J
C 10	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 11	CAP-1PF .1PF 50V MIN HIGH Q CHIP	1012-0027	JOHANSON	251R12Q1R0BP
C 12	CAP-2.2PF .5PF 50V NPO CHIP	1012-0003	KEMET	C0805C229D5GHH
C 13	CAP-4700 PF 5% 50V Z7R CHIP	1012-0031	VARADYNE	3BR050S472JS
C 14	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 15	CAP-4700 PF 5% 50V Z7R CHIP	1012-0031	VARADYNE	3BR050S472JS
C 16	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 17	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 18	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 19	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 20	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 22	CAP-1.5PF .25PF 50V NPO CHIP	1012-0002	VICLAN	0805NP01R5C50PS
C 23	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 24	CAP-8.2PF.5PF 50V NPO CHIP	1012-0030	NOVACAP	1005N8R2D500A
C 25	CAP-8.2PF.5PF 50V NPO CHIP	1012-0030	NOVACAP	1005N8R2D500A
C 26	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 27	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 28	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 29	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 30	CAP-5.5-18PF 350V NPO V MT CER TRMR	1001-0008	ERIE	CV31A180
C 31	CAP-.047UF 20% 100V V5W MINTR CER	1005-0096	ERIE	8121-100-651-473M
	DIODE			
CR 1	DIO-HP0180 SI STEP RCVY D07 4.6PF 50V	1282-0008	HP	5082-0180
CR 2	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
CR 3	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
CR 4	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
CR 5	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
	INDUCTOR			
L 1	CH-.82UH 10% RF MLD AXL .16DX.38L	1585-0061	DELEVAN	1537-10
L 2	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 3	CH-100UH 5% RF MLD AXL .16DX.38L	1585-0017	DELEVAN	1537-76
L 4	CH-10UH 10% RF MLD AXL .16DX.38L	1585-0016	DELEVAN	1537-36
L 5	CH-10UH 10% RF MLD AXL .16DX.38L	1585-0016	DELEVAN	1537-36
L 6	CH-.82UH 10% RF MLD AXL .16DX.38L	1585-0061	DELEVAN	1537-10
L 7	COIL-AIR CORE .136 DIA/22GA/9T	1596-0272		
L 8	COIL-AIR CORE .090 DIA/22GA/3T	1596-0271		
L 9	COIL-AIR CORE .250DIA/22GA/HALF TURN	1596-0309	CUSHMAN	C/E DWG & M/L
L 10	CH-.1UH 10% RF MLD SHLD AXL .16DX.40L	1585-0041	DELEVAN	1641-101

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO
	TRANSISTOR			
Q 1	XSTR-2N5179 NPN SI T072 LOW PWR (RCA)	1272-0067	RCA	2N5179 NO SUB
Q 2	XSTR-2N5109 NPN SI TO39 HIGH PWR	1272-0110	MOTOROLA	2N5109
Q 3	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
	RESISTOR			
R 1	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 2	RES-267 OHM 1% 100PPM FILM	1075-0083	CAT.LIST	55-100
R 3	RES-5.6 OHM 5% 1/4W CC	1066-0003	ALLEN BRADLEY	CB56G5
R 4	RES-402 OHM 1% 100PPM FILM	1075-0151	CAT. LIST	55-100
R 5	RES-162 OHM 1% 150PPM FILM	1074-1009		55-100
R 6	RES-33 OHM 5% 1/4W CC	1066-3305	ALLEN BRADLEY	CB3305
R 7	RES-33.2 OHM 1% 100PPM FILM	1075-0045	CAT.LIST	55-100
R 8	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 10	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2025
R 11	RES-620 OHM 5% 1/8W CC	1065-6215	ALLEN BRADLEY	BB6215
R 12	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 13	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 14	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 391[illegible]
R 15	RES-3.9K 5% 1/8W CC	1065-3925	ALLEN BRADLEY	BB3925
R 16	RES-430 OHM 5% 1/8 CC	1065-4315	ALLEN BRADLEY	BB4315
R 17	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 18	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 19	RES-100K 1% 100PPM FILM	1074-0109	CAT.LIST	55-C25
R 20	POT-10K 20% 1/2W 4T CERMET TRMR	1203-0061	BOURNS	3339P-1-[illegible]
R 21	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 22	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2025
R 23	RES-100K 5% 1/8W CC	1065-1045	ALLEN BRADLEY	BB1045
R 24	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2027
R 25	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 26	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 27	RES-39K 5% 1/4W CC	1066-3935	ALLEN BRADLEY	CB 393[illegible]
R 28	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 30	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 30	RES-22 OHM 5% 1/8W CC	1065-2205		
R 31	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
	TRANSFORMER			
T 1	XFMR-TOROIDAL BIFILAR	1579-0053	CUSHMAN	C/E DWG & M/L
	INTEGRATED CIRCUIT			
U 1	IC-CA3140T 8PIN CAN OP AMPL	2025-0238	RCA	CA3140T



6. POWER LEVELS MEASURED WITH HP436A POWER METER.
7. VOLTAGE MEASUREMENTS MADE USING A DVM (10 MΩ INPUT RESISTANCE)
8. INSTALLED IN CERTAIN UNITS DURING FINAL TEST

5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

NOTE:

OUT OF SEQUENCE LOCATION TABLE	
REF NO	APPROX LOC
R30	R12
R31	Q3

Figure 6-78. 72000 10 MHz Sampler.

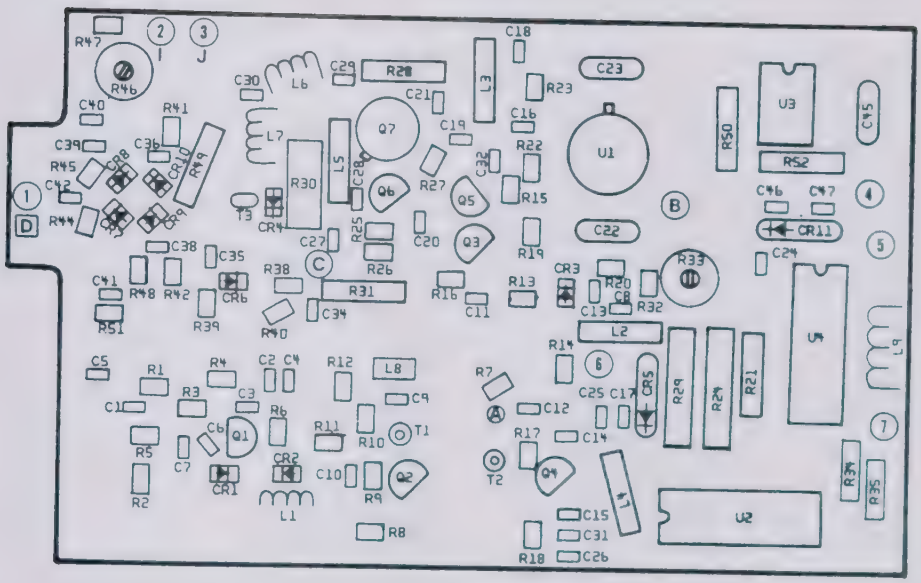
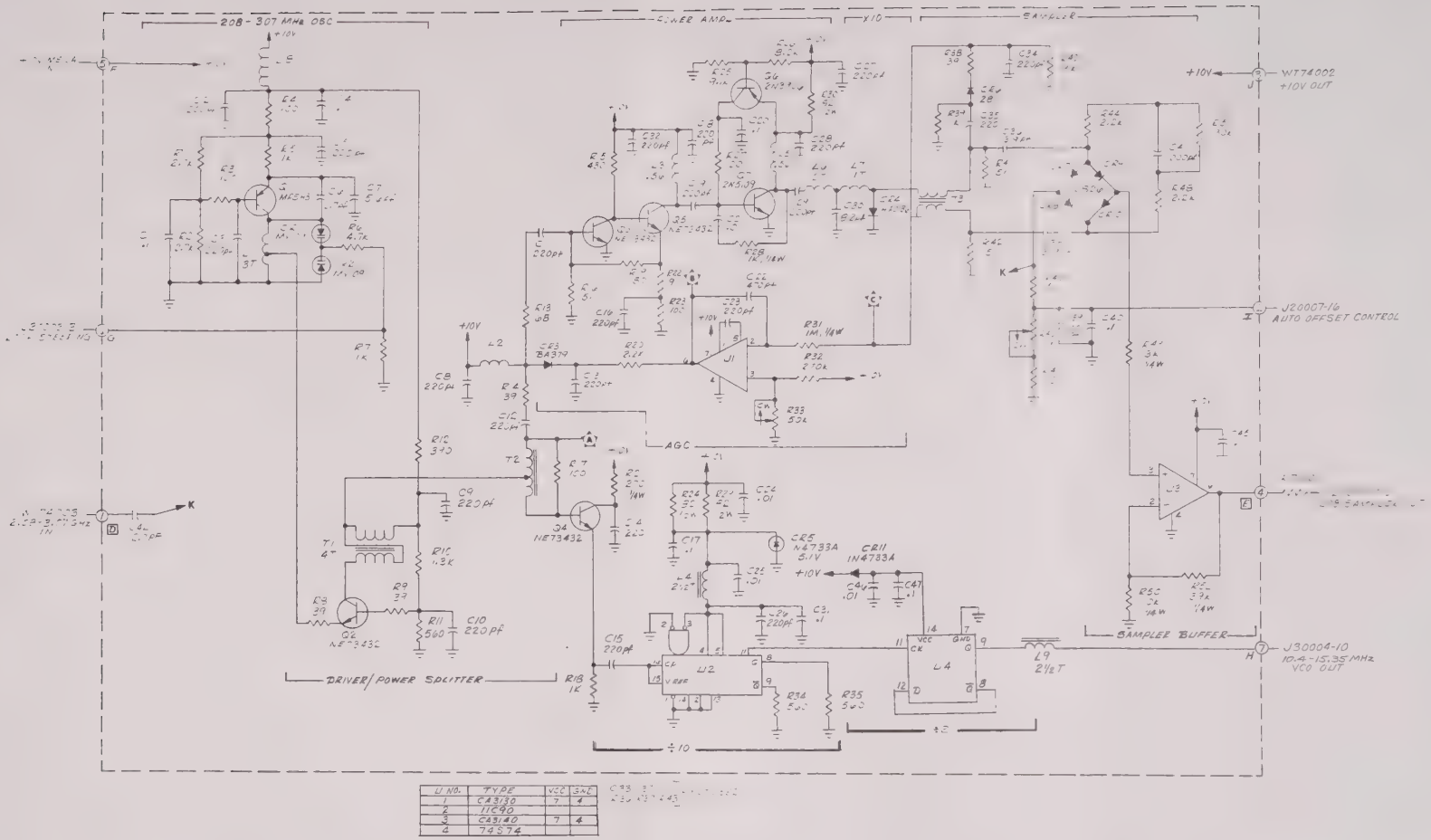


Figure 6-79. 73000 208.307 MHz VCO/Divide-By-10 Sampler, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
73000	PCB ASSY - 208-307 MHz VCO/÷10/SAMP	7001-0648	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1094	CUSHMAN	
	CAPACITOR			
C 1	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 2	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 3	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 4	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 5	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 6	CAP-2.7PF 10% 100V NPO MINTR CER	1005-0124	TUSONIX	8101-100-C0J0-279C
C 7	CAP-10PF 10% 100V NPO MINTR CER	1005-0074	TUSONIX	8101-100-C0G0-100K
C 8	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 9	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 10	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 11	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 12	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 13	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 14	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 15	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 16	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 17	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 18	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 19	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 20	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 21	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 22	CAP-470PF 5% 500V DIP MICA	1002-0035	SANGAMO	D155F471
C 23	CAP-220PF 5% 500V DIP MICA	1002-0029	ELMENCO	DM15-F-221J
C 24	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 25	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 26	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 27	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 28	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 29	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 30	CAP-8.2PF .5PF 50V NPO CHIP	1012-0030	NOVACAP	1005N8R2D500A
C 31	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 32	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 34	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 35	CAP-220PF 10% 100V W5R MINTR CER	1005-0075	ERIE	8101-100-XRRO-221K
C 36	CAP-3.9PF .5PF 50V NPO CHIP	1012-0022	JOHANSON	50R15Q-3R9DP
C 38	CAP-3.9PF .5PF 50V NPO CHIP	1012-0022	JOHANSON	50R15Q-3R9DP
C 39	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 40	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 41	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 42	CAP-2.7PF .25PF 50V NPO CHIP	1012-0032	NOR CAL ASSOC	3BP050S2R7C S
C 45	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 46	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 47	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
	DIODE			
CR 1	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
CR 2	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
CR 3	DIO-BA379 SI PIN	1281-0101	SIEMENS	BA379
CR 4	DIO-HP0136 SI STEP RCVY 3PF 25V	1282-0006	HP	5082-0136
CR 5	DIO-1N4733A SI ZENER DO41 5.1V 5% 1W	1281-0031	MOTOROLA	1N4733A
CR 6	DIO-HP2811 SI HOT CARR AIN 1.2PF 15PRV	1283-0004	HP	5082-2811
CR 7	DIO-HP2826 HOT CARR 1.2PF AIN 15PRV BM	1283-0005	HP	5082-2826
CR 8	DIO-HP2826 HOT CARR 1.2PF AIN 15PRV BM	1283-0005	HP	5082-2826

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
CR 9	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
CR 10	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
CR 11	DIO-1N4733A SI ZENER D041 5.1V 5% 1W	1281-0031	MOTOROLA	1N4733A
	INDUCTOR			
L 1	COIL-AIR CORE CT .114 DIA/20GA/3T	1596-0270		
L 2	CH-3B FERRITE BEAD 30GA/6T	1586-0007		
L 3	CH-.56UH 10% RF MLD AXL .10DX.25L	1585-0076	DELEVAN	1025-14
L 4	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
L 5	CH-.56UH 10% RF MLD AXL .10DX.25L	1585-0076	DELEVAN	1025-14
L 6	COIL-AIR CORE .090 DIA-22GA-2T	1596-0268		
L 7	ASSY-COIL-AIR CORE	1596-0068		
L 8	CH-3B FERRITE BEAD 30GA/6T	1586-0007		
L 9	ASSY-COIL-AIR CORE	1596-0072		
	TRANSISTOR			
Q 1	XSTR-MPSH81 PNP SI TO92 LOW PWR	1272-0111	MOTOROLA	MPSH81
Q 2	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z
Q 3	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z
Q 4	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z
Q 5	XSTR-NE73432E NPN SI TO92 LOW PWR	1272-0112	CALIF EASTERN LABS	6EM8Z
Q 6	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 7	XSTR-2N5109 NPN SI TO39 HIGH PWR	1272-0110	MOTOROLA	2N5109
	RESISTOR			
R 1	RES-2.7K 5% 1/8 CC	1065-2725	ALLEN BRADLEY	BB2725
R 2	RES-2.7K 5% 1/8 CC	1065-2725	ALLEN BRADLEY	BB2725
R 3	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 4	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 5	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025
R 6	RES-4.7K 5% 1/8W CC	1065-4725	ALLEN BRADLEY	BB4725
R 7	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025
R 8	RES-39 OHM 5% 1/8W CC	1065-3905	ALLEN BRADLEY	BB3905
R 9	RES-39 OHM 5% 1/8W CC	1065-3905	ALLEN BRADLEY	BB3905
R 10	RES-1.3K 5% 5% 1/8W CC	1065-1325	ALLEN BRADLEY	BB1325
R 11	RES-560 OHM 5% 1/8W CC	1065-5615	ALLEN BRADLEY	BB5615
R 12	RES-390 OHM 5% 1/8W CC	1065-3915	ALLEN BRADLEY	BB3915
R 13	RES-68 OHM 5% 1/8W CC	1065-6805	ALLEN BRADLEY	RC05GF680J
R 14	RES-39 OHM 5% 1/8W CC	1065-3905	ALLEN BRADLEY	BB3905
R 15	RES-430 OHM 5% 1/8 CC	1065-4315	ALLEN BRADLEY	BB4315
R 16	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 17	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 18	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025
R 19	RES-180 OHM 5% 1/8W CC	1065-1815	ALLEN BRADLEY	BB1815
R 20	RES-2.2K 5% 1/8W CC	1065-2225	ALLEN BRADLEY	BB2225
R 21	RES-270 OHM 5% 1/4W CC	1066-2715	ALLEN BRADLEY	CB2715
R 22	RES-91 OHM 5% 1/8W CC	1065-9105	ALLEN BRADLEY	BB9105
R 23	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 24	RES-82 OHM 5% 1/2W CC	1067-8205	ALLEN BRADLEY	EB 8205
R 25	RES-91K 5% 1/8W CC	1065-9125	ALLEN BRADLEY	BB9125
R 26	RES-8.2K 5% 1/8W CC	1065-8225	ALLEN BRADLEY	BB8225
R 27	RES-120 OHM 5% 1/8W CC	1065-1215		
R 28	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 29	RES-82 OHM 5% 1/2W CC	1067-8205	ALLEN BRADLEY	EB 8205
R 30	RES-82 OHM 5% 1/2W CC	1067-8205	ALLEN BRADLEY	EB 8205

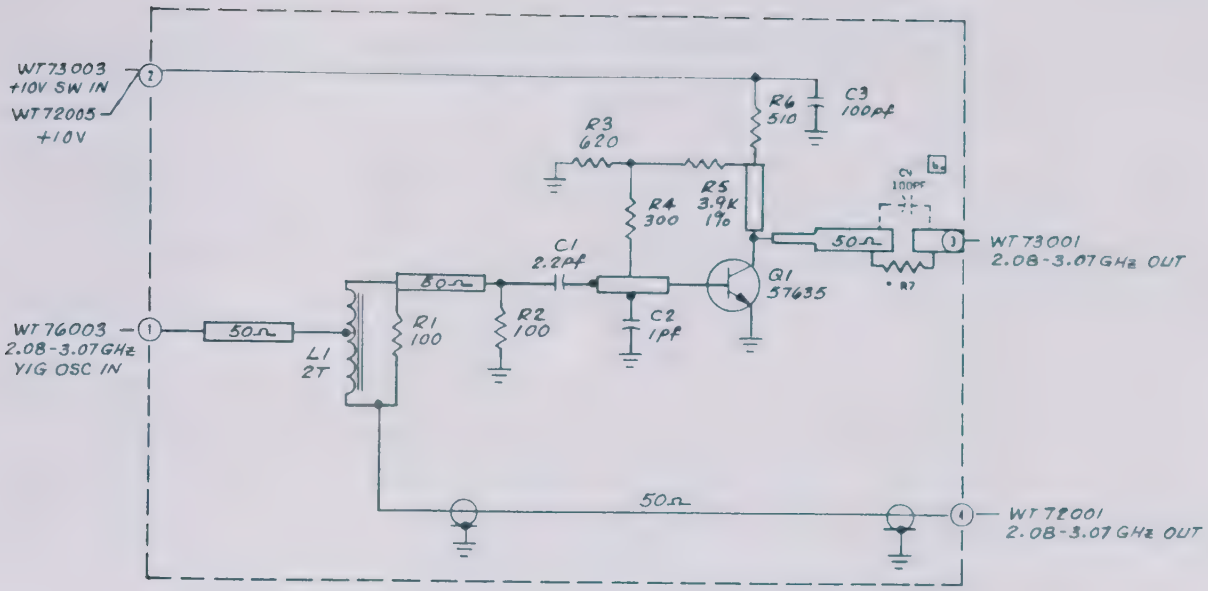
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 31	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 32	RES-270K 5% 1/8W CC	1065-2745	ALLEN BRADLEY	BB2745
R 33	POT-50K 20% 1/2W 4T CERMET TRMR	1203-0059	BOURNS	3339H-1-503
R 34	RES-560 OHM 5% 1/8W CC	1065-5615	ALLEN BRADLEY	BB5615
R 35	RES-560 OHM 5% 1/8W CC	1065-5615	ALLEN BRADLEY	BB5615
R 38	RES-39 OHM 5% 1/8W CC	1065-3905	ALLEN BRADLEY	BB3905
R 39	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025
R 40	RES-91K 5% 1/8W CARBON COMP	1065-9135		
R 41	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 42	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 44	RES-2.2K 5% 1/8W CC	1065-2225	ALLEN BRADLEY	BB2225
R 45	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 46	POT-10K 20% 1/2W 4T CERMET TRMR	1203-0061	BOURNS	3339H-1-103
R 47	RES-10 OHM 5% 1/8 CC	1065-1005	ALLEN BRADLEY	BB1005
R 48	RES-2.2K 5% 1/8W CC	1065-2225	ALLEN BRADLEY	BB2225
R 49	RES-3K 5% 1/4W CC	1066-3025	ALLEN BRADLEY	CB3025
R 50	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 51	RES-30K 5% 1/8W CC	1065-3035	ALLEN BRADLEY	BB3035
R 52	RES-39K 5% 1/4W CC	1066-3935	ALLEN BRADLEY	CB 3935
	TRANSFORMER			
T 1	XFMR-TOROIDAL 2/36GA/4T	1579-0050		
T 2	XFMR-TOROIDAL 2/36GA/4T	1579-0050		
T 3	XFMR-OVAL FERRITE 2/36 GA/2T	1579-0049		
	INTEGRATED CIRCUIT			
U 1	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T
U 2	IC-11C90 16PIN DIP DIV 10/11 PRESCALER	2025-0182	FAIRCHILD	11C90DC
U 3	IC-CA 3140E 8 PIN DIP OP AMPL	2025-0237		
U 4	IC-74S74 DUAL D POS EDGE TRIG FF W/P&C	2025-0125	TEXAS INSTRUMENTS	SN74S74N



U NO.	TYPE	VCC	GND
1	CA3130	7	4
2	11C90		
3	CA3140	7	4
4	74S74		

NOTE:
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-80. 73000 208.307 MHz VCO/Divide-By-10 Sampler.



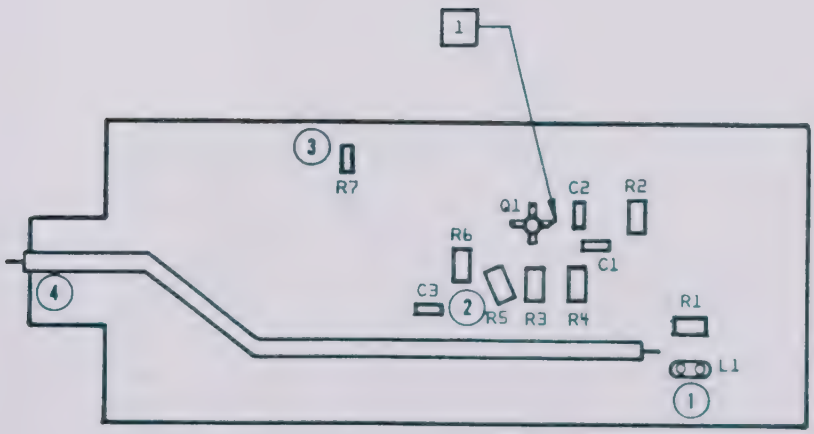
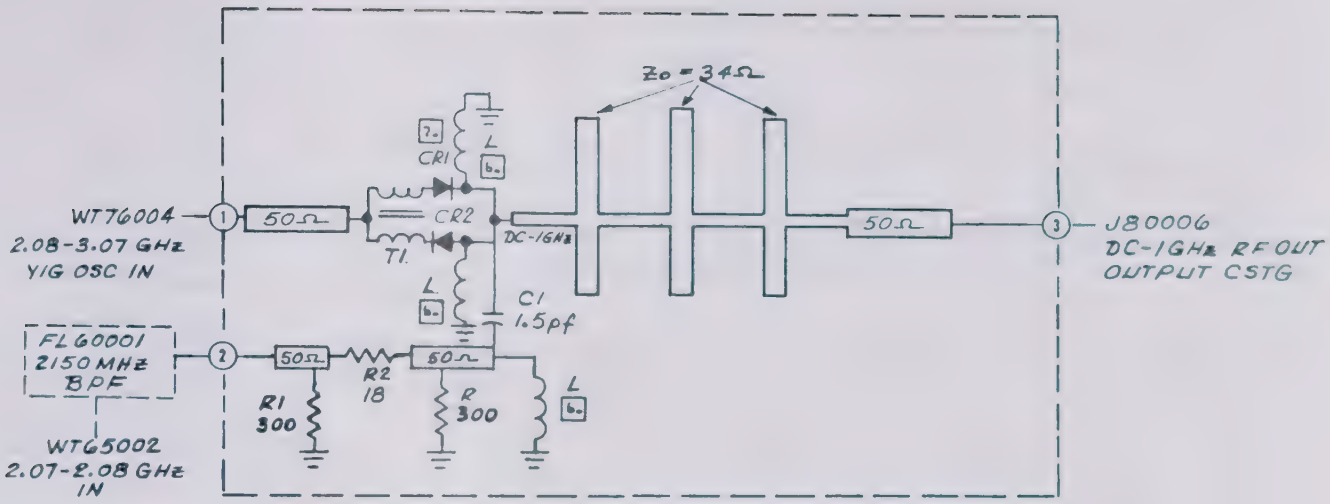


Figure 6-81. 74000 3dB Power Splitter Buffer Amplifier.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
74000	PCB ASSY - 3dB PWR SPLTR/BFR AMP	7001-0477	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1016	CUSHMAN	
	CAPACITOR			
C 1	CAP-2.2PF .5PF 50V NPO CHIP	1012-0003	KEMET	C0805C229D5GHH
C 2	CAP-1PF .5PF 50V NPO CHIP	1012-0019	VITRAMON	VJ0805A1R0DH
C 3	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
	TRANSISTOR			
Q 1	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
	RESISTOR			
R 1	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 2	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 3	RES-620 OHM 5% 1/8W CC	1065-6215	ALLEN BRADLEY	BB6215
R 4	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 5	RES-3.9K 5% 1/8W CC	1065-3925	ALLEN BRADLEY	BB3925
R 6	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 7	RES-30 OHM 5% 1/8W CC	1065-3005	ALLEN-BRADLEY	BB3005
	TRANSFORMER			
T 1	XFMR-OVAL FERRITE 2/36 GA/2T	1579-0049		



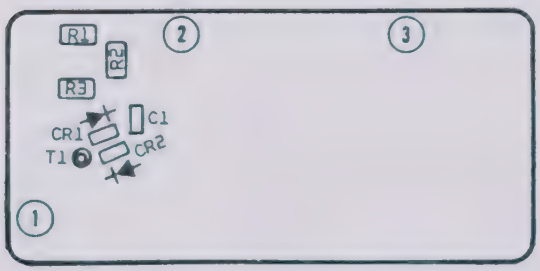
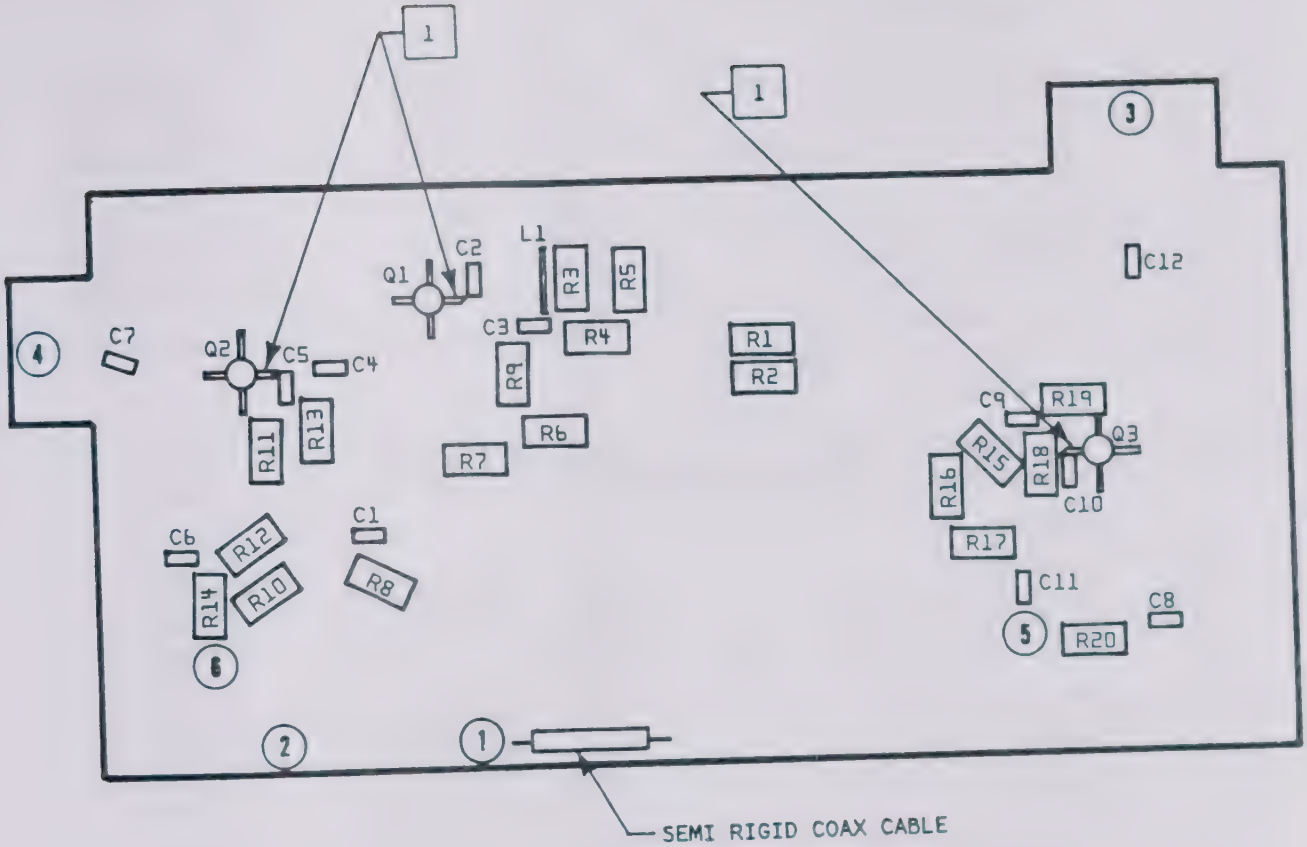


Figure 6-82. 75000 Final Mixer and 1.1 GHz Low Pass Filter.

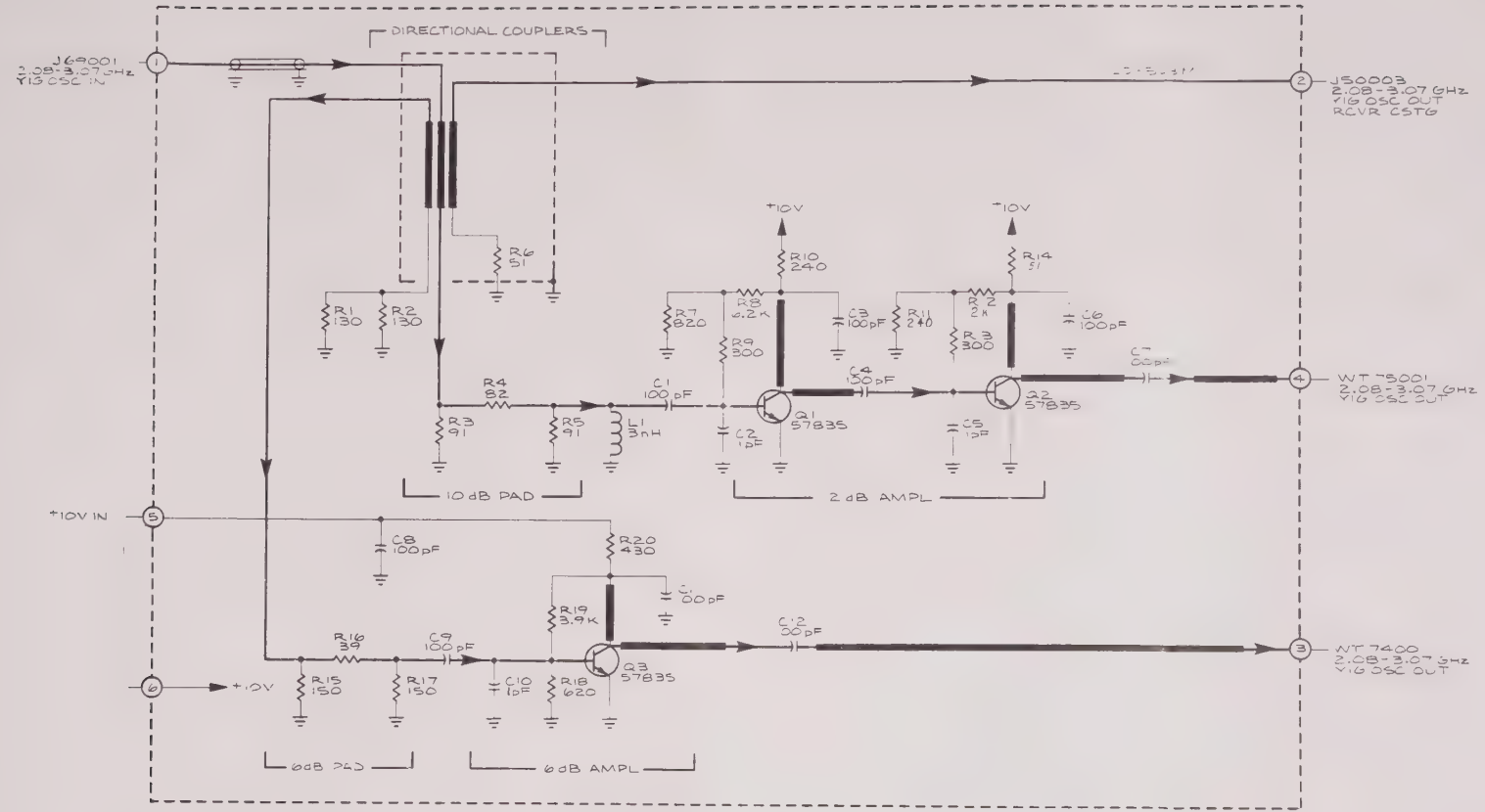
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
75000	PCB ASSY - FINAL MIXER & 1.1 GHz LPF	7001-0478	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1024	CUSHMAN	
	CAPACITOR			
C 1	CAP-1.5PF .25PF 100V NPO MINTR CER	1005-0121	CENTRE ENGINEERING	100-100-NPO 159C
	DIODE			
CR 1	DIO-HP2811 SI HOT CARR AIN 1.2PF 15PRV	1283-0004	HP	5082-2811
CR 2	DIO-HP2811 SI HOT CARR AIN 1.2PF 15PRV	1283-0004	HP	5082-2811
	RESISTOR			
R 1	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 2	RES-18 OHM 5% 1/4W CC	1066-1805	ALLEN BRADLEY	CB1805
R 3	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
	TRANSFORMER			
T 1	XFMR-TOROIDIAL BIFILAR	1579-0042		



1 BASE LEAD OF Q1, Q2, AND Q3 ARE ANGLE CUT. ORIENT AS SHOWN.

Figure 6-83. 76000 Directional Coupler, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
7e000	PCB ASSY - DIRECTIONAL COUPLER	7001-0601	CUSHMAN	CE-50A-1/TG ONLY
	PRINTED CIRCUIT BOARD	1780-1080	CUSHMAN	
	CAPACITOR			
C 1	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 2	CAP-1PF .1PF 50V MIN HIGH Q CHIP	1012-0027	JOHANSON	251R12Q1R0BP
C 3	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 4	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 5	CAP-1PF .1PF 50V MIN HIGH Q CHIP	1012-0027	JOHANSON	251R12Q1R0BP
C 6	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 7	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 8	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 9	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 10	CAP-1PF .1PF 50V MIN HIGH Q CHIP	1012-0027	JOHANSON	251R12Q1R0BP
C 11	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 12	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
	TRANSISTOR			
Q 1	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 2	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 3	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
	RESISTOR			
R 1	RES-130 OHM 5% 1/8W CC	1065-1315	ALLEN BRADLEY	BB1315
R 2	RES-130 OHM 5% 1/8W CC	1065-1315	ALLEN BRADLEY	BB1315
R 3	RES-91 OHM 5% 1/8W CC	1065-9105	ALLEN BRADLEY	BB9105
R 4	RES-82 OHM 5% 1/8W CC	1065-8205	ALLEN BRADLEY	BB8205
R 5	RES-91 OHM 5% 1/8W CC	1065-9105	ALLEN BRADLEY	BB9105
R 6	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 7	RES-820 OHM 5% 1/8 CC	1065-8215	ALLEN BRADLEY	BB8215
R 8	RES-6.2K 5% 1/8W CC	1065-6225	ALLEN BRADLEY	BB6225
R 9	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 10	RES-240 OHM 5% 1/8W CC	1065-2415	ALLEN BRADLEY	BB2415
R 11	RES-240 OHM 5% 1/8W CC	1065-2415	ALLEN BRADLEY	BB2415
R 12	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2025
R 13	RES-300 OHM 5% 1/8W CC	1065-3015	ALLEN BRADLEY	BB3015
R 14	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 15	RES-150 OHM 5% 1/8W CC	1065-1515	ALLEN BRADLEY	BB1515
R 16	RES-39 OHM 5% 1/8W CC	1065-3905	ALLEN BRADLEY	BB3905
R 17	RES-150 OHM 5% 1/8W CC	1065-1515	ALLEN BRADLEY	BB1515
R 18	RES-620 OHM 5% 1/8W CC	1065-6215	ALLEN BRADLEY	BB6215
R 19	RES-3.9K 5% 1/8W CC	1065-3925	ALLEN BRADLEY	BB3925
R 20	RES-430 OHM 5% 1/8 CC	1065-4315	ALLEN BRADLEY	BB4315



NOTE.
6. ALL CAPACITORS CHIP CAPS UNLESS OTHERWISE NOTED.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μf UNLESS OTHERWISE NOTED.
1. RESISTOR 1/8W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-84 76000 Directional Coupler

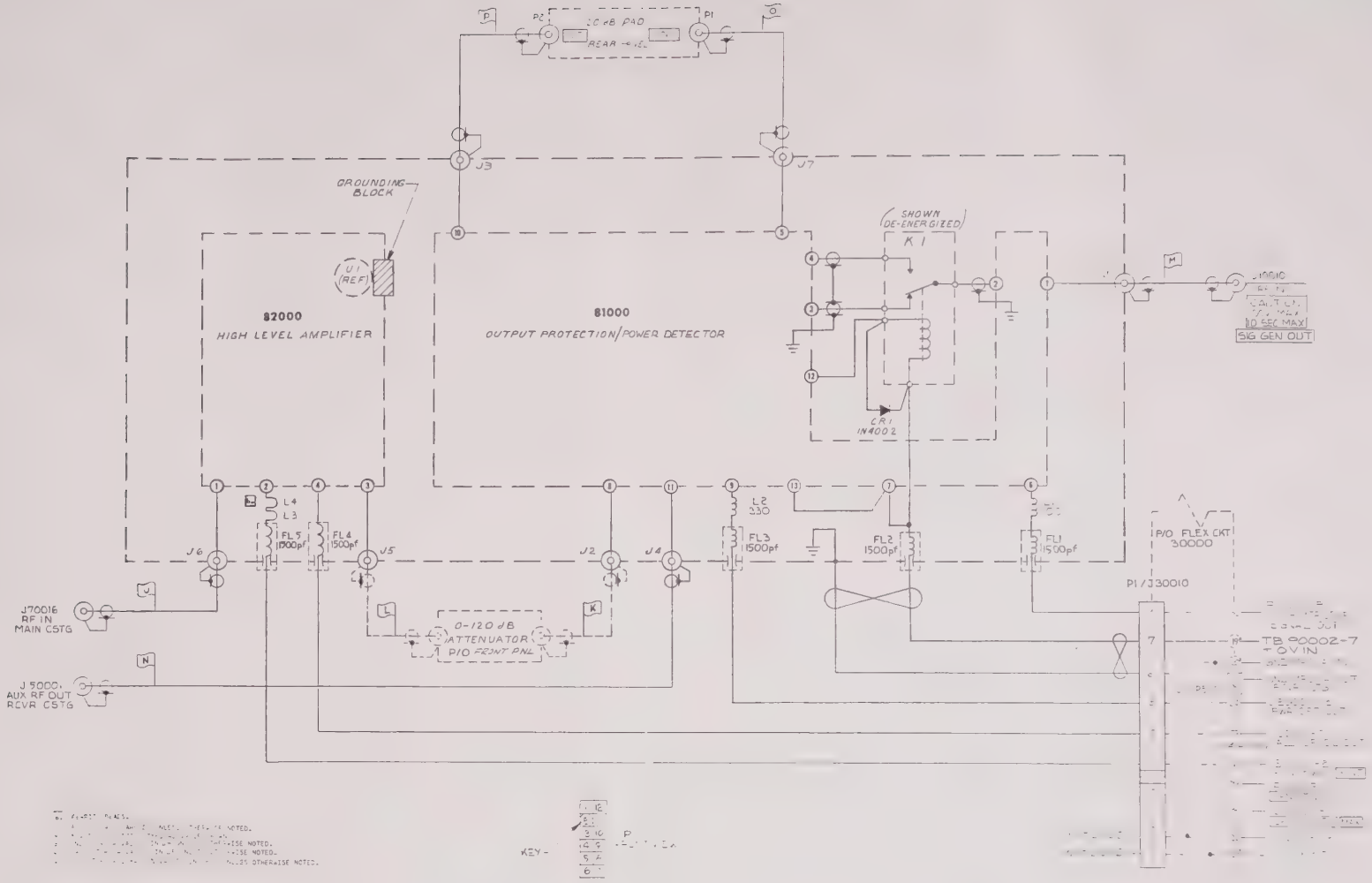
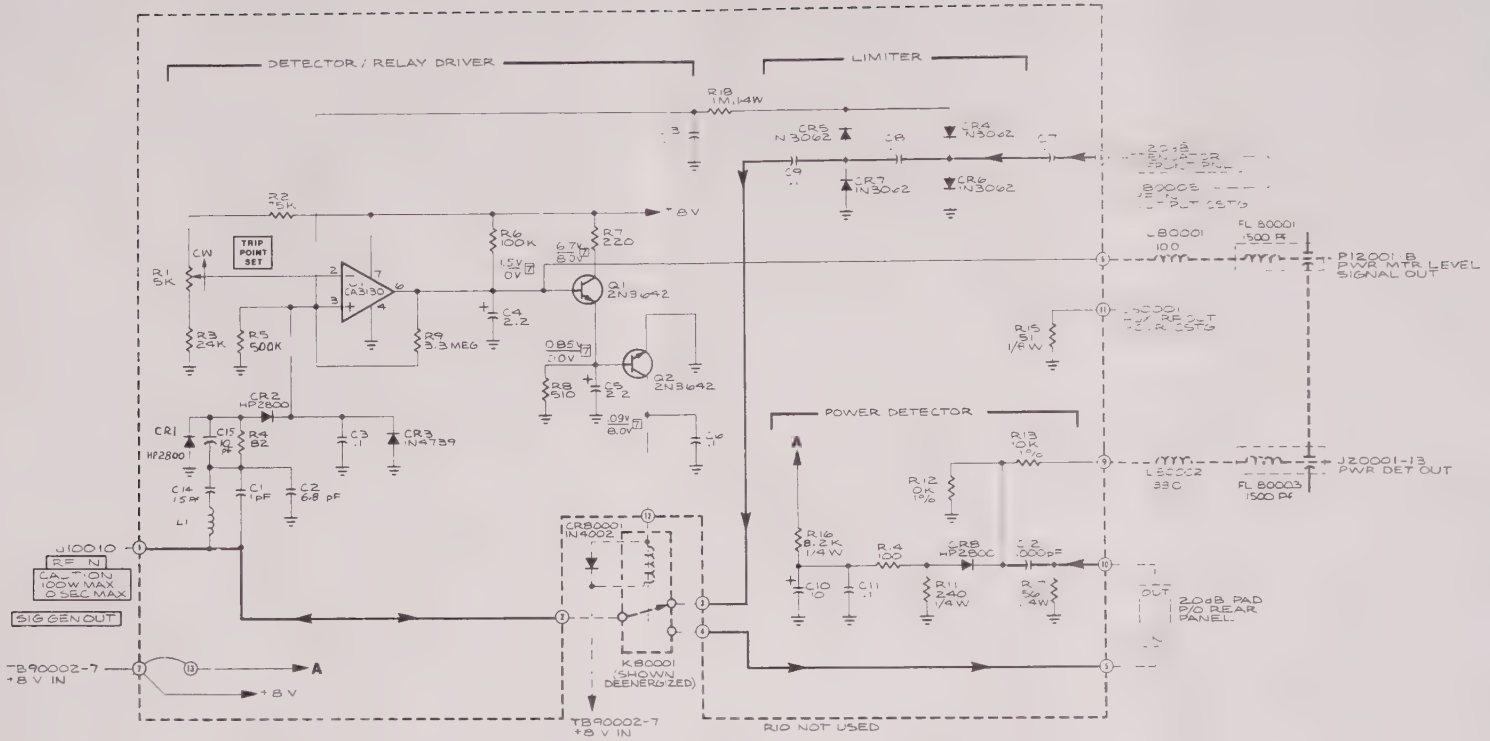


Figure 6-85. 80000 RF Output Casting.



1. TOP VOLTAGE IS RELAY IN POWER MODE AND LOWER VOLTAGE IS RELAY IN SIG. GEN. MODE
2. VOLTAGES MEASURED WITH A DVM HAVING 10MΩ INPUT IMPEDANCE.
3. ALL VOLTAGES ARE DC ± 10% UNLESS OTHERWISE NOTED
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
6. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
7. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-87. 81000 Output Protection/Power Detector.

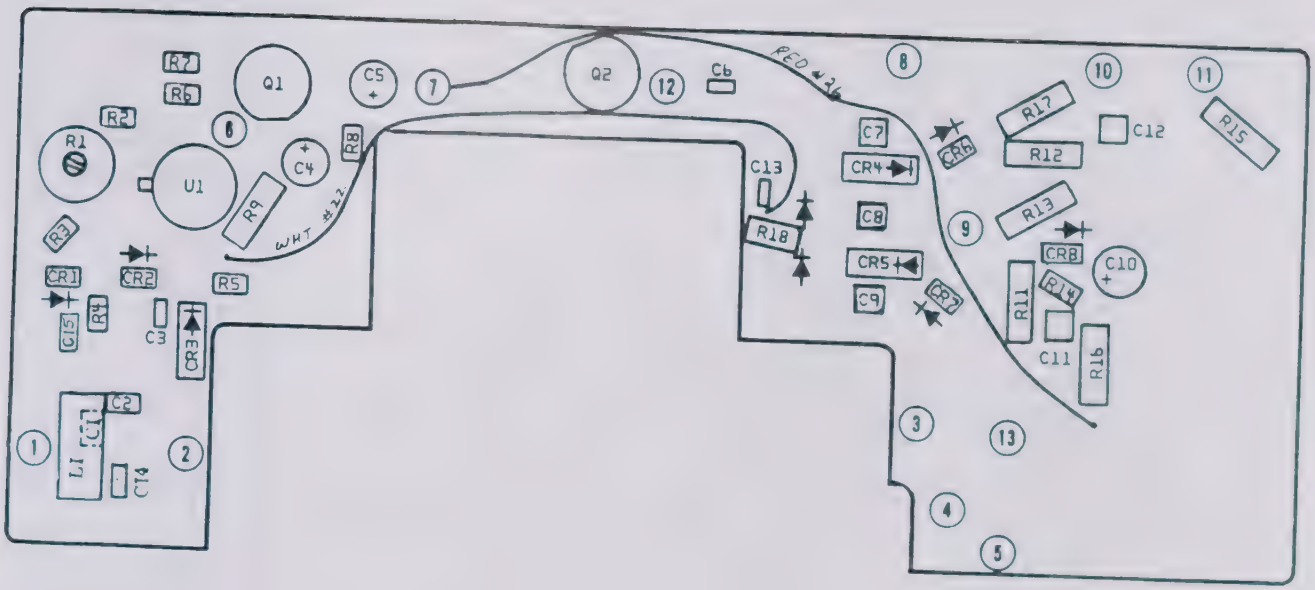
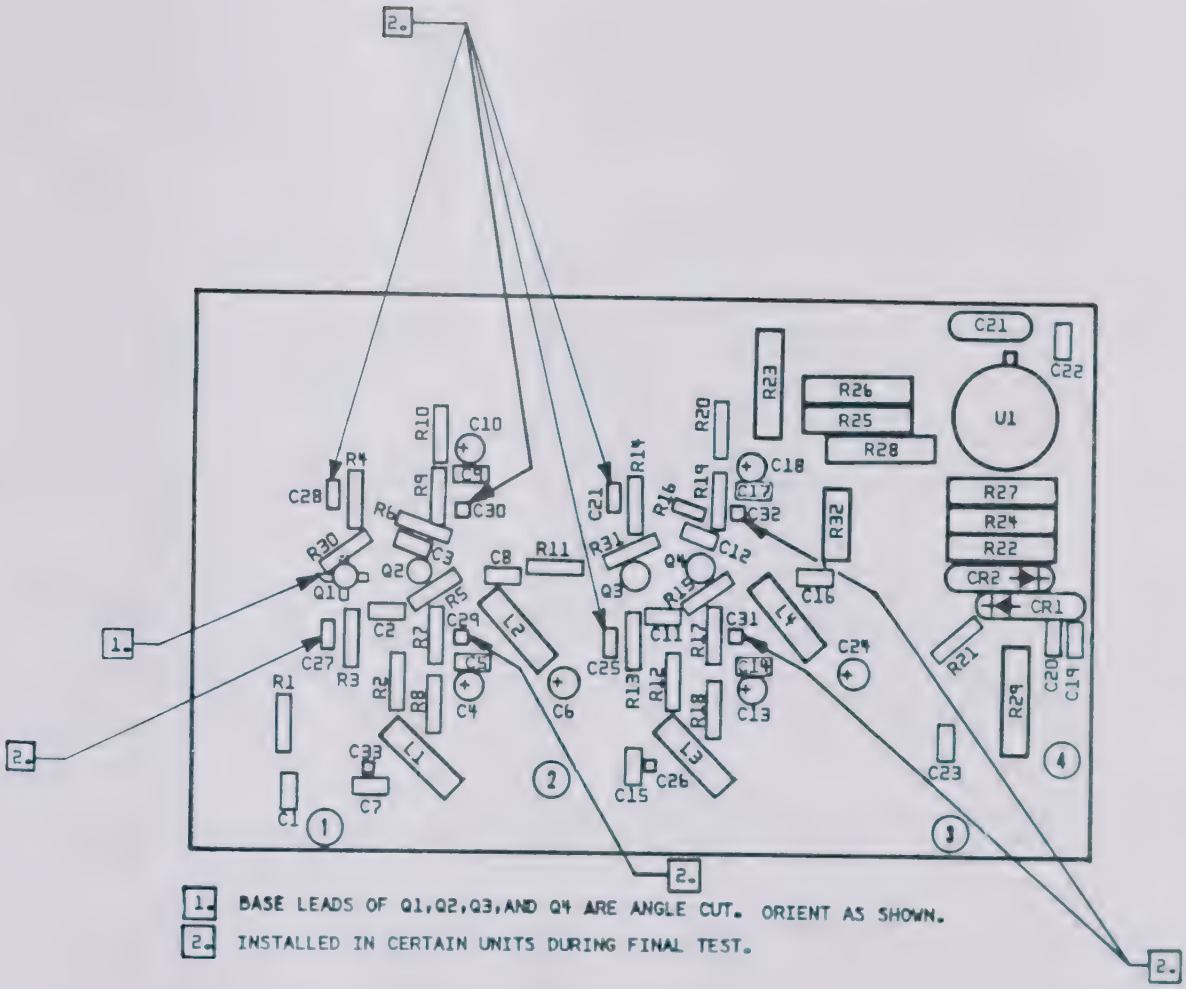


Figure 6-86. 81000 Output Protection/Power Detector, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
81000	PCB ASSY - OUTPUT PROT/PWR DET	7001-0505	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1012	CUSHMAN	
	CAPACITOR			
C 1	CAP-1PF .5PF 50V NPO CHIP	1012-0019	VITRAMON	VJ0805A1R0DH
C 2	CAP-6.8PF .5PF 50V NPO CHIP	1012-0012	VARADYNE	30BN050S6R8CS
C 3	CAP-.1UF 20% 50V M.NTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 4	CAP-2.2UF 10% 35V RDL TANT	1011-0001	SPRAGUE	196D225X9035JA1
C 5	CAP-2.2UF 10% 35V RDL TANT	1011-0001	SPRAGUE	196D225X9035JA1
C 6	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 7	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 8	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 9	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 10	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 11	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 12	CAP-1000PF 10% 100V WSR MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 13	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 14	CAP-.1 5PF .25PF 100V NPO MINTR CER	1005-0121	CENTRE ENGINEERING	100-100-NPO 159C
C 15	CAP-10PF 10% 100V NPO MINTR CER	1005-0074	TUSONIX	8101-100-C0G0-100K
	DIODE			
CR 1	DIO-HP2800 SI HOT CARR AIN 2PF 70PRV	1283-0001	HP	5082-2800
CR 2	DIO-HP2800 SI HOT CARR AIN 2PF 70PRV	1283-0001	HP	5082-2800
CR 3	DIO-1N4739A SI ZENER A98A 9.1V 5% 1W	1281-0027	IRC	1N4739A
CR 4	DIO-1N3062 SI SW D07 1PF 75PRV	1281-0080	ITT	1N3062
CR 5	DIO-1N3062 SI SW D07 1PF 75PRV	1281-0080	ITT	1N3062
CR 6	DIO-1N3062 SI SW D07 1PF 75PRV	1281-0080	ITT	1N3062
CR 7	DIO-1N3062 SI SW D07 1PF 75PRV	1281-0080	ITT	1N3062
CR 8	DIO-HP2800 SI HOT CARR AIN 2PF 70PRV	1283-0001	HP	5082-2800
	INDUCTOR			
L 1	CH-2 1/2 TURN WIDEBAND 4B	1586-0003	FERROXCUBE	VK20020/4B
	TRANSISTOR			
Q 1	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
Q 2	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
	RESISTOR			
R 1	POT-5K 10% 1/2W 1T CERMET TRMR	1215-0053	ALLEN BRADLEY	A2A502
R 2	RES-75K 5% 1/8W CC	1065-7535	ALLEN BRADLEY	BB7535
R 3	RES-2.4K 5% 1/8W CC	1065-2425	ALLEN BRADLEY	BB2425
R 4	RES-82 OHM 5% 1/8W CC	1065-8205	ALLEN BRADLEY	BB8205
R 5	RES-500K 5% 1/8W CC	1065-5145	ALLEN BRADLEY	BB5145
R 6	RES-100K 5% 1/8W CC	1065-1045	ALLEN BRADLEY	BB1045
R 7	RES-220 OHM 5% 1/8W CC	1065-2215		
R 8	RES-510 OHM 5% 1/8W CC	1065-5115	ALLEN BRADLEY	BB5115
R 9	RES-3.3MEG 5% 1/4W CC	1066-3355	ALLEN BRADLEY	CB3355
R 11	RES-240 OHM 5% 1/4W CC	1066-2415	ALLEN BRADLEY	CB2415
R 12	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 13	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 14	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 15	RES-51 OHM 5% 1/8W CC	1065-5105	ALLEN BRADLEY	BB5105
R 16	RES-8.2K 5% 1/4W CC	1066-8225	ALLEN BRADLEY	CB 8225
R 17	RES-56 OHM 5% 1/4W CC	1066-5605	ALLEN BRADLEY	CB 5605
R 18	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
	INTEGRATED CIRCUIT			
U 1	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T

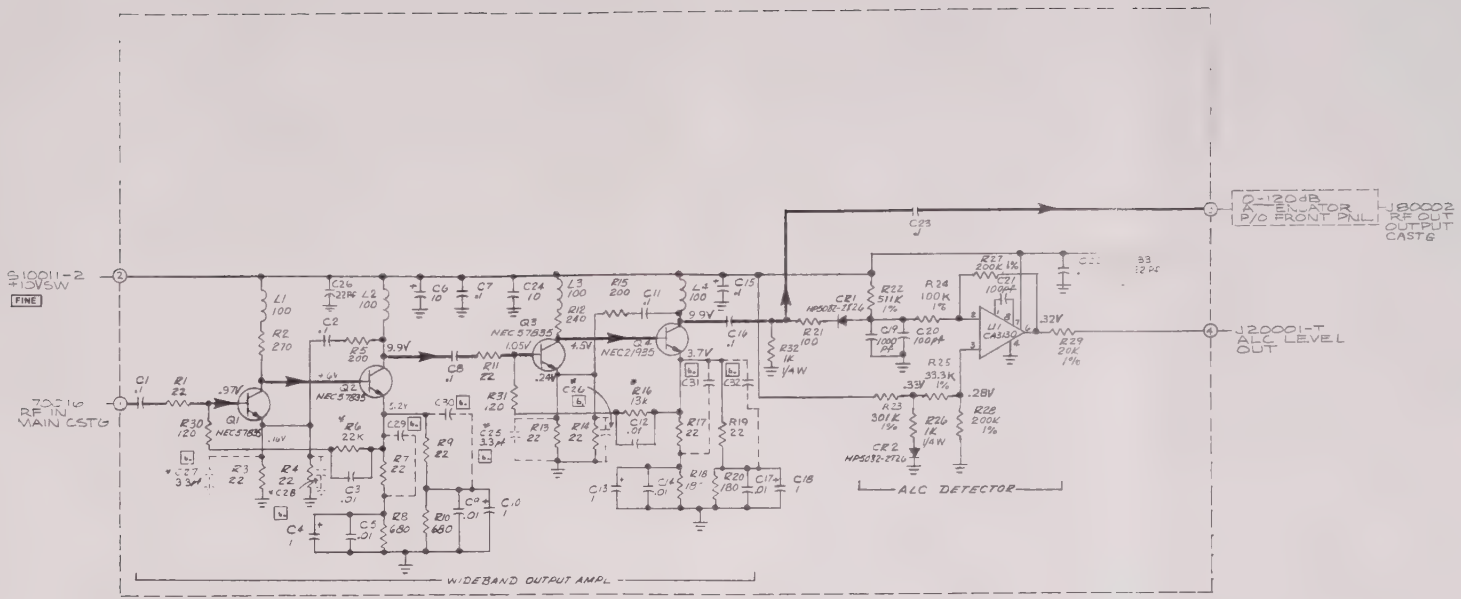


1. BASE LEADS OF Q1,Q2,Q3,AND Q4 ARE ANGLE CUT. ORIENT AS SHOWN.
2. INSTALLED IN CERTAIN UNITS DURING FINAL TEST.

Figure 6-88. 82000 High Level Amplifier, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
82000	PCB ASSY - HI LEVEL AMP	7001-0504	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1013	CUSHMAN	
	CAPACITOR			
C 1	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 2	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 3	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 4	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 5	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 6	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 7	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 8	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 11	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 12	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 13	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 14	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 15	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 16	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 19	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 20	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
C 21	CAP-100PF 5% 500V DIP MICA	1002-0011	ELMENCO	DM15-F-101J
C 22	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 23	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 24	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 25	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 27	CAP-3.3PF 10% 100V NPO MINTR CER	1005-0132	TUSONIX	8101-100-C0J0-339C
C 33	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
C 34	CAP-22PF 5% 50V NPO CHIP	1012-0007	VARADYNE	3BN050S220JS
	DIODE			
CR 1	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
CR 2	DIO-HP2826 HOT CARR 1.2PF A1N 15PRV BM	1283-0005	HP	5082-2826
	INDUCTOR			
L 1	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 2	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 3	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 4	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 5	CH-.047 X .138 X .118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
	TRANSISTOR			
Q 1	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 2	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 3	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 4	XSTR-NE 21935 NPN SI LOW PWR	1272-0120	NEC	NE 21935
	RESISTOR			
R 1	RES-22 OHM 5% 1/8W CC	1065-2205		
R 2	RES-270 OHM 5% 1/8W CC	1065-2715	ALLEN BRADLEY	BB2715
R 3	RES-22 OHM 5% 1/8W CC	1065-2205		
R 4	RES-22 OHM 5% 1/8W CC	1065-2205		
R 5	RES-200 OHM 5% 1/8W CC	1065-2015	ALLEN BRADLEY	BB2015

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 6	RES-22K 5% 1/8W CC	1065-2235	ALLEN-BRADLEY	BB2235
R 7	RES-22 OHM 5% 1/8W CC	1065-2205		
R 8	RES-680 OHM 5% 1/8W CC	1065-6815	ALLEN BRADLEY	BB6815
R 9	RES-22 OHM 5% 1/8W CC	1065-2205		
R 10	RES-680 OHM 5% 1/8W CC	1065-6815	ALLEN BRADLEY	BB6815
R 11	RES-22 OHM 5% 1/8W CC	1065-2205		
R 12	RES-240 OHM 5% 1/8W CC	1065-2415	ALLEN BRADLEY	BB2415
R 13	RES-22 OHM 5% 1/8W CC	1065-2205		
R 14	RES-22 OHM 5% 1/8W CC	1065-2205		
R 15	RES-200 OHM 5% 1/8W CC	1065-2015	ALLEN BRADLEY	BB2015
R 16	RES-13K 5% 1/8W CC	1065-1335	ALLEN BRADLEY	BB1335
R 17	RES-22 OHM 5% 1/8W CC	1065-2205		
R 18	RES-120 OHM 5% 1/8W CC	1065-1215	ALLEN BRADLEY	BB1215
R 19	RES-22 OHM 5% 1/8W CC	1065-2205		
R 20	RES-120 OHM 5% 1/8W CC	1065-1215	ALLEN BRADLEY	BB1215
R 21	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 22	RES-511K 1% 100PPM FILM	1075-0156	CAT. LIST	55-100
R 23	RES-301K 1% 150PPM FILM	1074-1037	CAT.LIST	55-100
R 24	RES-100K 1% 100PPM FILM	1074-0109	CAT.LIST	55-025
R 25	RES-33.3K 1% 100PPM FILM	1075-0072	CAT.LIST	55-100
R 26	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 27	RES-200K 1% 100PPM FILM	1075-0148	CAT. LIST	55-100
R 28	RES-200K 1% 100PPM FILM	1075-0148	CAT. LIST	55-100
R 29	RES-20K 1% 100PPM FILM	1075-0096	CAT.LIST	55-100
R 30	RES-120 OHM 5% 1/8W CC	1065-1215		
R 31	RES-120 OHM 5% 1/8W CC	1065-1215		
R 32	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
	INTEGRATED CIRCUIT			
U 1	IC-CA3130T OP AMPL	2025-0161	RCA	CA3130T



NOTE:
1. RESISTORS - 1/8W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
6. INSTALLED IN CERTAIN UNITS DURING FINAL TEST, 3.3 UF TYP
7. VOLTAGES ARE MEASURED WITHOUT RF INPUT, USING A DVM WITH 10MΩ INPUT IMPEDANCE.

Figure 6-89. 82000 High Level Amplifier.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
90000	REAR PANEL ASSY	7003-0129	CUSHMAN	CE-50 FAMILY
	POWER PANEL ASSY	7003-0136	CUSHMAN	(EXCEPT 5100'S)
	ATTENUATOR			
AT 90001	ATTEN-20DB 50 OHM 25W DUAL BNC JK	2381-0004	RCL ELEC. INC.	A-2726
	CAPACITOR			
C 90002	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 90003	CAP-2200PF 20% 3KV Z5U CER DISC	1005-0098	CRL	DD30222M
C 90004	CAP-2200PF 20% 3KV Z5U CER DISC	1005-0098	CRL	DD30222M
	DIODE			
CR 90001	DIO-6AL1 SI RECT 100PRV 6A	1281-0110	SARKES TARZIAN	6AL1
	FILTER			
F 90001	FU-5 AMP 250V 3 AG FAST BLO	1955-0026	LITTELFUSE	312005
F 90002	FU-1-1/2 AMP	1955-0007	LITTLEFUSE	3AG-31201.5
	CONNECTOR			
J 90003	CONN-3 PIN AC PWR RECEPT PNL MT	2535-0096	SWITCHCRAFT	EAC-301
J 90004	POST-BINDING RED INSULATED HEAD	2595-0003	SUPERIOR	DF21RC
J 90005	POST-BINDING BLACK INSULATED HEAD	2595-0002	SUPERIOR	DF21BC
	SPEAKER			
LS 30001	SPKR-3X3 3.2 OHM 3W	1715-0007		
	TRANSISTOR			
Q 90001	XSTR-TIP34A PNP SI B19 HIGH PWR/SW	1272-0095	TI	TIP34A
Q 90002	XSTR-TIP34A PNP SI B19 HIGH PWR/SW	1272-0095	TI	TIP34A
Q 90003	XSTR-TIP33A NPN SI X86 HIGH PWR/SW	1272-0084	TI	TIP33A
Q 90004	XSTR-MJE 13007 NPN SI TO220AB HIGH PWR	1272-0115	MOTOROLA	MJE 13007
Q 90005	XSTR-MJE 13007 NPN SI TO220AB HIGH PWR	1272-0115	MOTOROLA	MJE 13007
Q 90006	XSTR-MJE370 PNP SI B16D HIGH PWR	1272-0102	MOTOROLA	MJE370
	SWITCH			
S 90001	SW-SLIDE 115/230V	1850-0012	SWITCHCRAFT	46256LFR

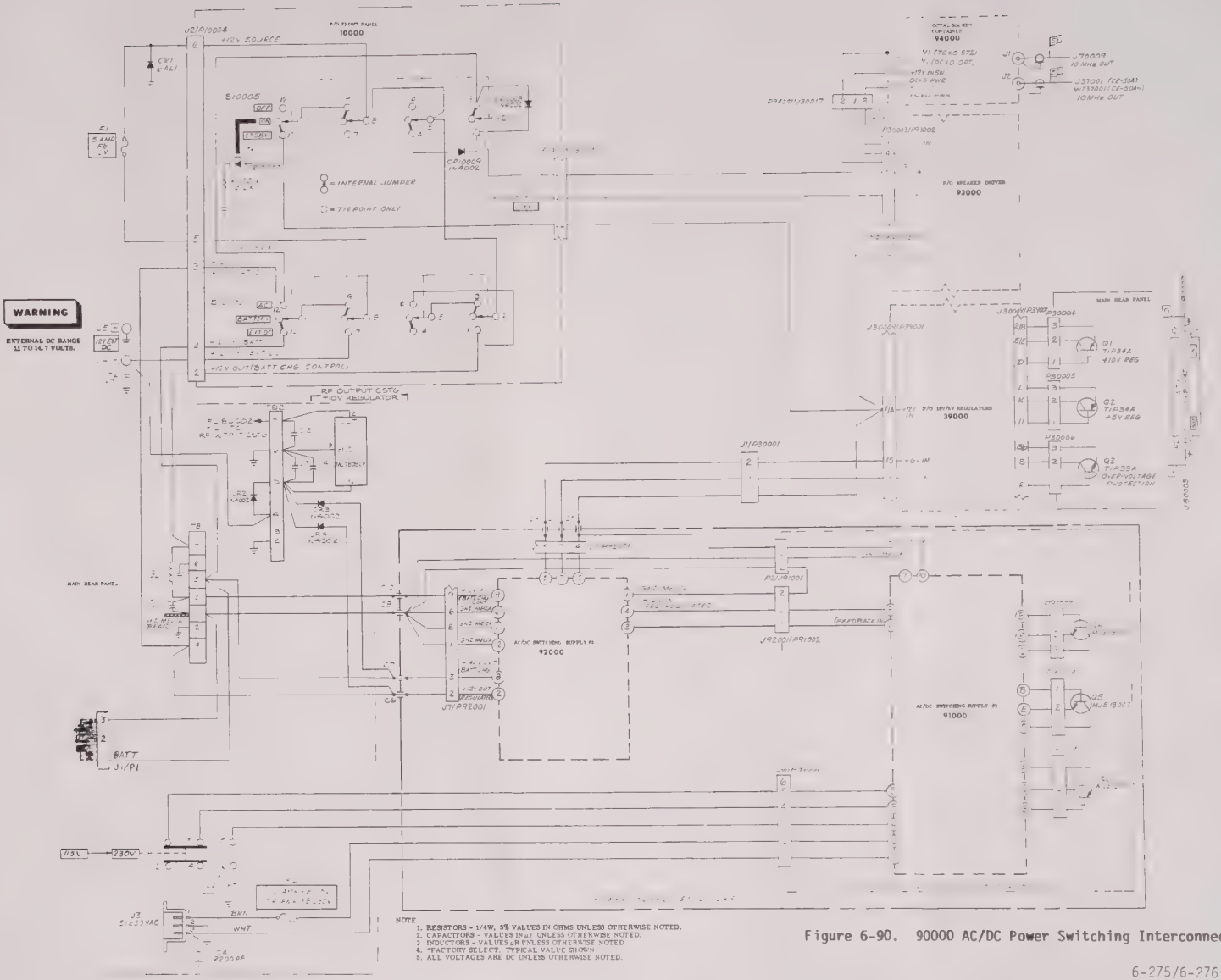


Figure 6-90. 90000 AC/DC Power Switching Interconnect Diagram.

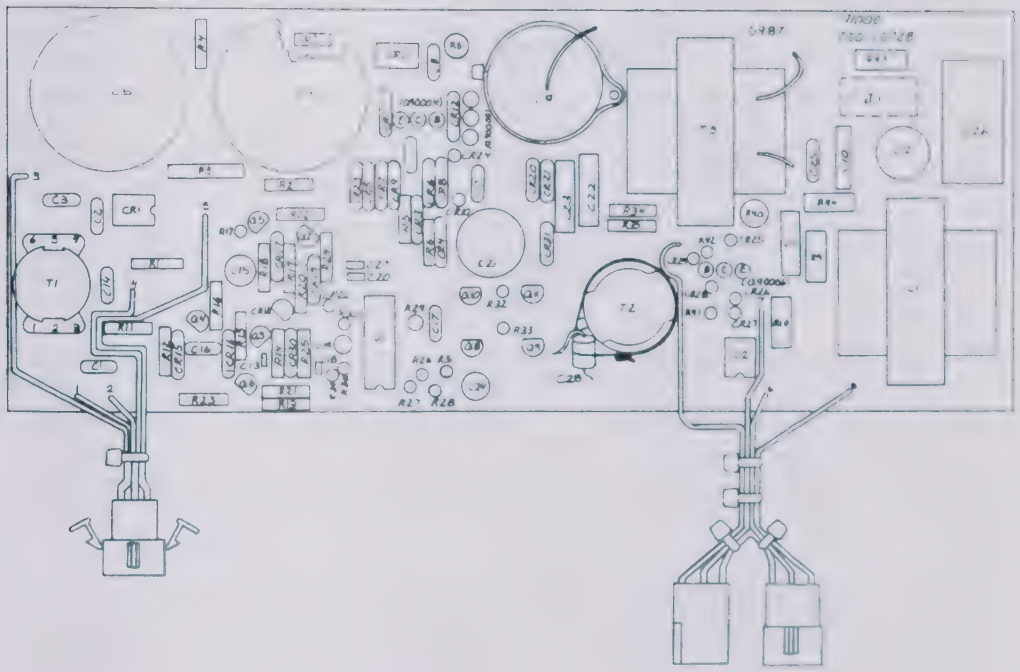
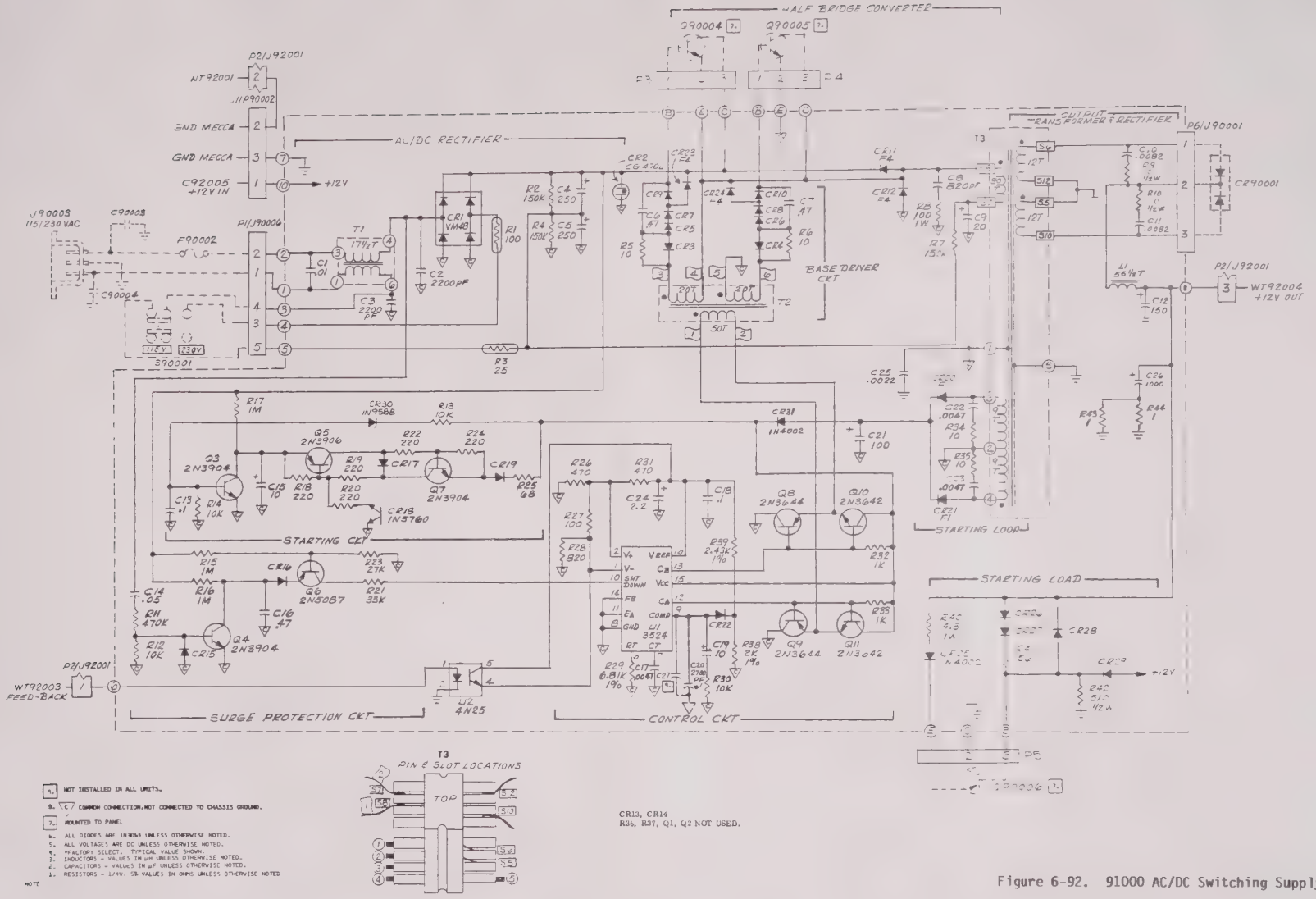


Figure 6-91. 91000 AC/DC Switching Supply #1, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
91000	PCB ASSY - AC/DC SW SUPPLY NO 1	7001-0728	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0987	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 1.4KV CER DISC	1005-0051	SPRAGUE	125L-S10
C 2	CAP-2200PF 20% 3KV Z5U CER DISC	1005-0098	CRL	DD30222M
C 3	CAP-2200PF 20% 3KV Z5U CER DISC	1005-0098	CRL	DD30222M
C 4	CAP-250 UF+75-10% 200V 120L ELCTLT SCR	1013-0040	CORNELL DUBILIER	FAH-25-200-A1
C 5	CAP-250 UF+75-10% 200V 120L ELCTLT SCR	1013-0040	CORNELL DUBILIER	FAH-25-200-A1
C 6	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 7	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 8	CAP-820PF 10% 1KV Z5R CER DISC	1005-0047	CENTRALAB	DD821
C 9	CAP-20UF +50-10% 450V AXL ELCTLT	1014-0023	CORNELL DUBILIER	WBR20-450
C 10	CAP-.0082UF 5% 600V RDL POLYESTER	1008-0095	PLESSEY CAP.	60C822V630
C 11	CAP-.0082UF 5% 600V RDL POLYESTER	1008-0095	PLESSEY CAP.	60C822V630
C 12	CAP-150 UF 20% 35V RDL ELCTLT	1013-0048	ILLINOIS CAP	157RLR035M
C 13	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 14	CAP-.05UF +80-20% 500V Z5U CER DISC	1005-0052	SPRAGUE	5HK-S50
C 15	CAP-10UF 20% 50V RDL ELCTLT	1013-0046	NICHICON	50UKB-10-M
C 16	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 17	CAP-.0047UF 10% 100V AXL POLYESTER	1008-0085	SPRAGUE	225P47291WD3
C 18	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 19	CAP-10UF 20% 35V RDL TANT	1011-0006	MATSUO	221L3502106M3
C 20	CAP-2700PF 5% 100V NPO MINTR CER	1005-0130	CENTRE	200-100-NPO-272J
C 21	CAP-100UF +100-10% 50V RDL ELCTLT	1013-0036	ILL. CAP	100-R-50
C 22	CAP-.0047UF 10% 100V AXL POLYESTER	1008-0085	SPRAGUE	225P47291WD3
C 23	CAP-.0047UF 10% 100V AXL POLYESTER	1008-0085	SPRAGUE	225P47291WD3
C 24	CAP-2.2UF 10% 35V RDL TANT	1011-0001	SPRAGUE	196D225X9035JA1
C 25	CAP-2200PF 20% 3KV Z5U CER DISC	1005-0098	CRL	DD30222M
C 26	CAP-1000UF +50-10% 25V ELCTLT	1014-0006	ILLINOIS	108TTA025A
C 28	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
	DIODE			
CR 1	DIO-VM48 SI BRDG RECT 6 PIN DIP 400PRV	1281-0103	VARO	VM48
CR 2	DIO-CG2-470L 470V 15% SURGE ARRESTOR	1281-0130	CLARET CO	CG2-4706
CR 3	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 5	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 7	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 8	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 9	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 10	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 11	DIO-F4 SI SW A294A 400PRV.5A	1281-0129	SEMTECH	F4
CR 12	DIO-F4 SI SW A294A 400PRV.5A	1281-0129	SEMTECH	F4
CR 15	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 16	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 17	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 18	DIO-1N 5760 SI BILATERAL TRIG 28V .3W	1281-0132	MOTOROLA	1N5760
CR 19	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 20	DIO-F1 SI SW A294A 100PRV .5A	1281-0128	SEMTECH	F1
CR 21	DIO-F1 SI SW A294A 100PRV .5A	1281-0128	SEMTECH	F1
CR 22	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 23	DIO-F4 SI SW A294A 400PRV.5A	1281-0129	SEMTECH	F4
CR 24	DIO-F4 SI SW A294A 400PRV.5A	1281-0129	SEMTECH	F4
CR 25	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO
CR 26	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 27	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 28	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 29	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
CR 30	DIO-1N958B SI ZENER D07 7.5V 5% .4W	1281-0071	MOTOROLA	1N958B
CR 31	DIO-1N4002 SI RECT A23F 100PRV 1A	1281-0023	ITT	1N4002
	CONNECTOR			
J 1	CONN-3 PIN.1SP RTANG LKG PCB MT JK	2535-0173	METHODE	100-9-103-01
	INDUCTOR			
L 1	INDCTR-E-TYPE CORE 41X39/55.5T/16GA	1596-0260		
	TRANSISTOR			
Q 3	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 4	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 5	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 6	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 7	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 8	XSTR-2N3644 PNP SI R110A LOW PWR/SW	1272-0040	FAIRCHILD	2N3644
Q 9	XSTR-2N3644 PNP SI R110A LOW PWR/SW	1272-0040	FAIRCHILD	2N3644
Q 10	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
Q 11	XSTR-2N3642 NPN SI R110A LOW PWR	1272-0018	FAIRCHILD	PN3642
	RESISTOR			
R 1	THMS-100 OHM 10% 8MW AXL/RDL DISC	1253-0006		LB21L2
R 2	RES-150K 5% 1/4W CC	1066-1545	ALLEN BRADLEY	CB1545
R 3	THMS-25 OHM 10% 25MW AXL/RDL DISC	1253-0005	RODAN INDUSTRIES	5DB250K
R 4	RES-150K 5% 1/4W CC	1066-1545	ALLEN BRADLEY	CB1545
R 5	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 6	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 7	RES-150K 5% 1/4W CC	1066-1545	ALLEN BRADLEY	CB1545
R 8	RES-100 OHM 5% 1W CC	1068-1015	ALLEN BRADLEY	GB 1015
R 9	RES-10 OHM 5% 1/2W CC	1067-1005	ALLEN BRADLEY	EB 1005
R 10	RES-10 OHM 5% 1/2W CC	1067-1005	ALLEN BRADLEY	EB 1005
R 11	RES-470K 5% 1/4W CC	1066-4745	ALLEN BRADLEY	CB 4745
R 12	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 13	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 14	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 15	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H ONLY
R 16	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H ONLY
R 17	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H ONLY
R 18	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 19	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 20	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 21	RES-33K 5% 1/4W CC	1066-3335	ALLEN BRADLEY	CB3335
R 22	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 23	RES-27K 5% 1/4W CC	1066-2735	ALLEN BRADLEY	CB2735
R 24	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 25	RES-68 OHM 5% 1/4W CC	1066-6805	ALLEN BRADLEY	CB 6805
R 26	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 27	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 28	RES-820 OHM 5% 1/4W CC	1066-8215	ALLEN BRADLEY	CB 8215
R 29	RES-6.81K 1% 100PPM FILM	1075-0140	CAT LIST	55-100
R 30	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R 31	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715
R 32	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 33	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 34	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 35	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 38	RES-2K 1% 100PPM FILM	1075-0103	CAT.LIST	55-100
R 39	RES-2.43K 1% 100PPM FILM	1075-0019	CAT.LIST	55-100
R 40	RES-4.3OHM 5% 1W CC	1068-0001	ALLEN BRADLEY	GB43G5
R 41	RES-56 OHM 5% 1/4W CC	1066-5605	ALLEN BRADLEY	CB 5605
R 42	RES-510 OHM 5% 1/2W CC	1067-5115	ALLEN BRADLEY	EB5115
R 43	RES-1 OHM 5% 1/2W CC	1067-0001	ALLEN BRADLEY	EB 0001
R 44	RES-1 OHM 5% 1/2W CC	1067-0001	ALLEN BRADLEY	EB 0001
	TRANSFORMER			
T 1	XFMR-POT CORE 18X11	1575-0054		
T 2	XFMR-POT CORE 22X13	1575-0055		
T 3	XFMR-E-TYPE CORE 41X39	1575-0053	MINI-MAGNETICS	C/E DWG
	INTEGRATED CIRCUIT			
U 1	IC-3524 16 PIN DIP RGLT PLS WD MOP	2025-0179	SILICON GENERAL	SG35245
U 2	IC-4N25 OPTO-ISOLATOR 2500V	2025-0159	MONSANTO	4N25



T3 PIN & SLOT LOCATIONS

CR13, CR14
R36, R37, Q1, Q2 NOT USED.

NOTES:
4. NOT INSTALLED IN ALL UNITS.
8. ⏚ COMMON CONNECTION, NOT CONNECTED TO CHASSIS GROUND.
7. ⏚ MOUNTED TO PANEL.
6. ALL DIODES ARE 1N3064 UNLESS OTHERWISE NOTED.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED

NOTT

Figure 6-92. 91000 AC/DC Switching Supply #1.

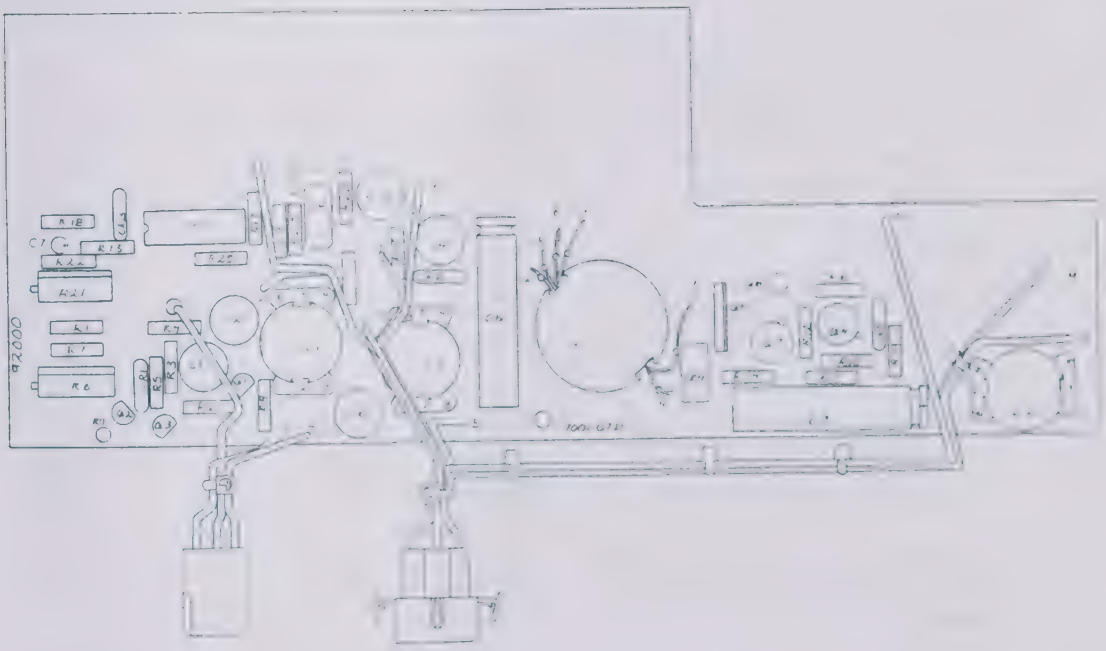
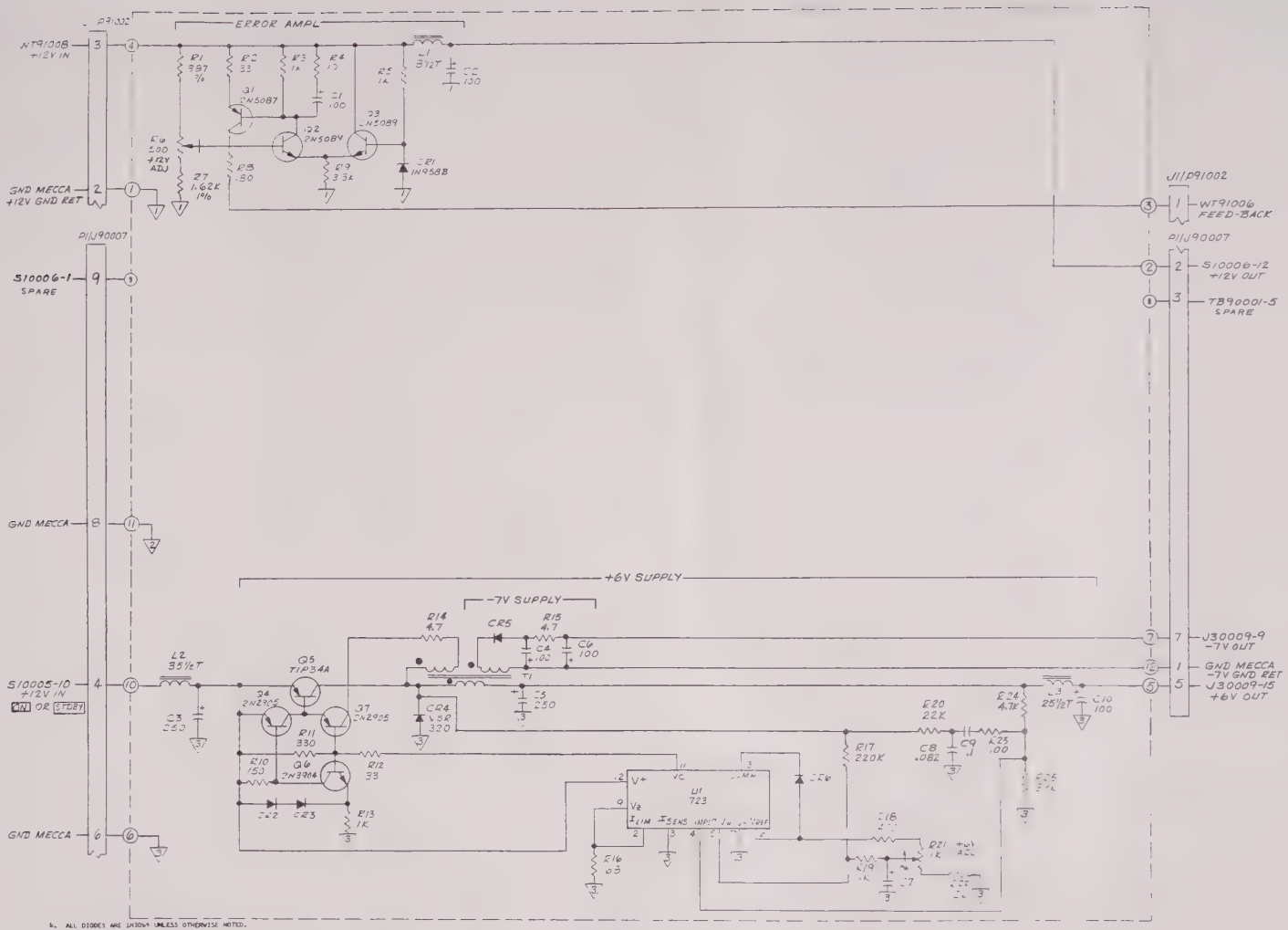


Figure 6-93 92000 AC/DC Switching Supply #2, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO
92005	PCB ASSY - AC/DC SW SUPPLY NO 2	7001-0721	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-1042	CUSHMAN	
	CAPACITOR			
C 1	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 2	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 3	CAP-250UF +75-10% 16V AXL ELCTLT	1013-0016	CORNELL DUBILIER	NLW250-16
C 4	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 5	CAP-250UF +75-10% 16V AXL ELCTLT	1013-0016	CORNELL DUBILIER	NLW250-16
C 6	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 7	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 8	CAP-.082UF 10% 100V RDL POLYESTER	1008-0023	SPRAGUE	225P82391WA3
C 9	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 10	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
	DIODE			
CR 1	DIO-1N958B SI ZENER DO7 7.5V 5% .4W	1281-0071	MOTOROLA	1N958B
CR 2	DIO-1N3064 SI SW DO7/DO35 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-1N3064 SI SW DO7/DO35 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 4	DIO-VSK320 SI RECT 20PRV 3A	1281-0127	VARO	VSK320
CR 5	DIO-1N3064 SI SW DO7/DO35 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 6	DIO-1N3064 SI SW DO7/DO35 75PRV .25W	1281-0013	FAIRCHILD	1N3064
	INDUCTOR			
L 1	INDCTR-POT CORE 18X11/8.5T/18GA	1596-0264		
L 2	INDCTR-POT CORE 18X11/35.5T/24GA	1596-0262		
L 3	INDCTR-POT CORE 18X11/25.5T/22GA	1596-0263		
	TRANSISTOR			
Q 1	XSTR-2N5087 PNP SI TO 92 LOW PWR	1272-0038	MOTOROLA	2N5087
Q 2	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 3	XSTR-2N5089 NPN SI TO 92 LOW PWR	1272-0031	MOTOROLA	2N5089
Q 4	XSTR-2N2905 PNP SI TO 5 LOW PWR/SW	1272-0035	MOTOROLA	2N2905
Q 5	XSTR-TIP34A PNP SI B19 HIGH PWR/SW	1272-0095	TI	TIP34A
Q 6	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 7	XSTR-2N2905 PNP SI TO 5 LOW PWR/SW	1272-0035	MOTOROLA	2N2905
	RESISTOR			
R 1	RES-887 OHM 1% 100PPM FILM	1075-0022	CAT.LIST	55-100
R 2	RES-33 OHM 5% 1/4W CC	1066-3305	ALLEN BRADLEY	CB3305
R 3	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 4	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 5	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 6	POT-500 OHM 10% 3/4W 15T CERMET TRMR	1215-0011	HELITRIM	89WR
R 7	RES-1.62K 1% 100PPM FILM	1075-0104	CAT.LIST	55-100
R 8	RES-180 OHM 5% 1/4W CC	1066-1815	ALLEN BRADLEY	CB1815
R 9	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 10	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 11	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 12	RES-33 OHM 5% 1/4W CC	1066-3305	ALLEN BRADLEY	CB3305
R 13	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 14	RES-4.7 OHM 5% 1/4W CC	1066-0001	ALLEN BRADLEY	CB47G5
R 15	RES-4.7 OHM 5% 1/4W CC	1066-0001	ALLEN BRADLEY	CB47G5
R 16	RES-68 OHM 5% 1/4W CC	1066-6805	ALLEN BRADLEY	CB 6805
R 17	RES-220K 5% 1/4W CC	1066-2245	ALLEN BRADLEY	CB2245
R 18	RES-470 OHM 5% 1/4W CC	1066-4715	ALLEN BRADLEY	CB 4715

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO
R 19	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 20	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 21	POT-1K 10% 3/4W 15T CERMET TRMR	1215-0013	HELITRIM	89WR
R 22	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 23	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 24	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 25	RES-39K 5% 1/4W CC	1066-3935	ALLEN BRADLEY	CB 3935
	TRANSFORMER			
T 1	XFMR-POT CORE 26X16	1575-0056		
	INTEGRATED CIRCUIT			
U 1	IC-723 PREC VOLTAGE REG	2025-0155	FAIRCHILD	723DC



NOTE

a. ALL DIODES ARE 1N3064 UNLESS OTHERWISE NOTED.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
9. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-94. 92000 AC/DC Switching Supply #2.

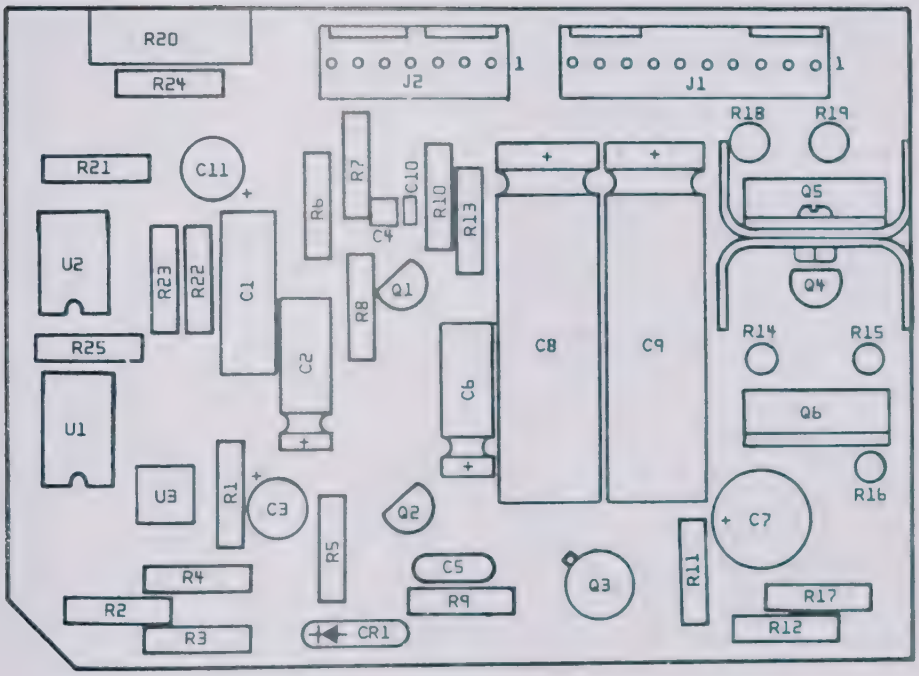
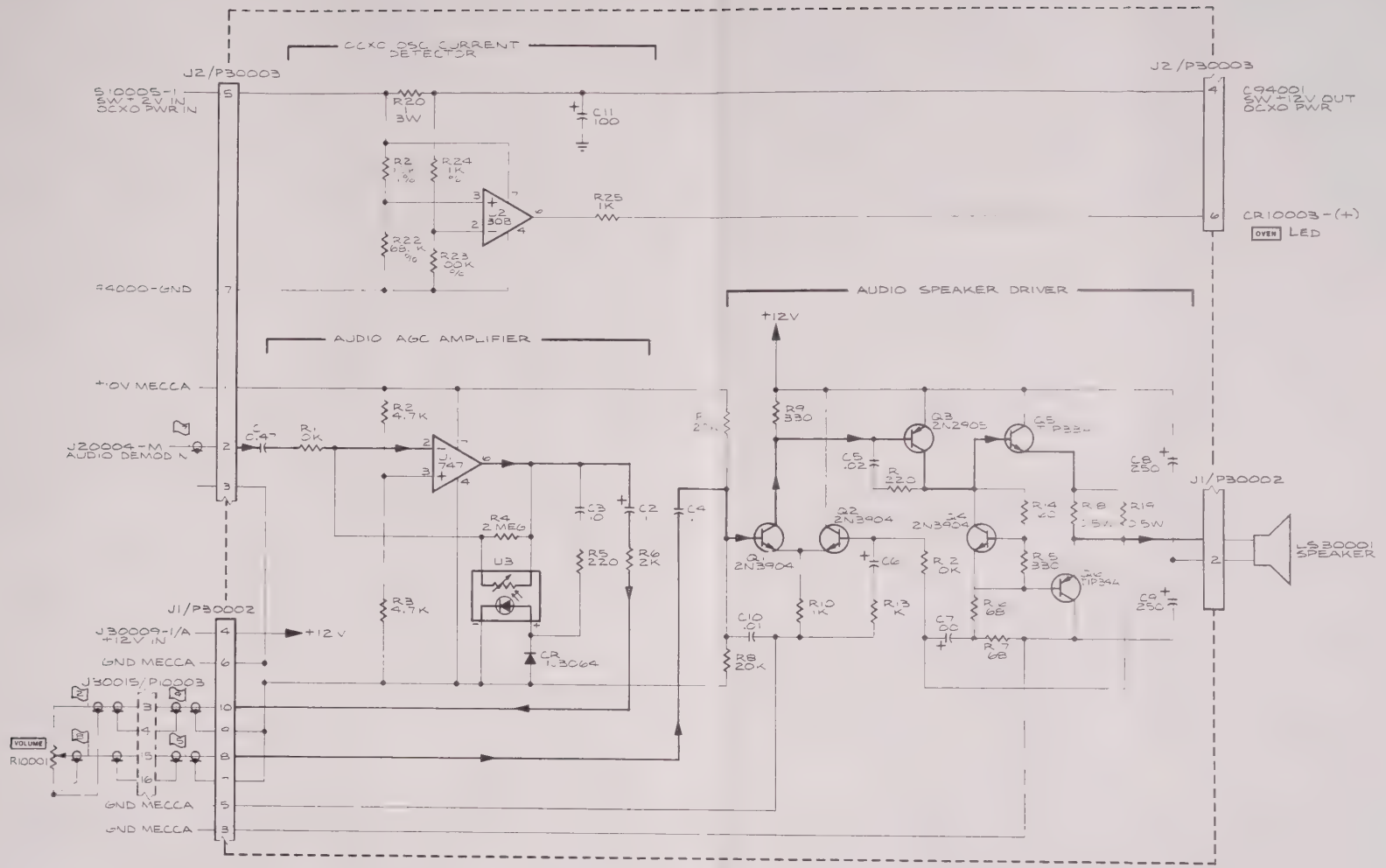


Figure 6-95. 93000 Speaker Driver, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
93000	PCB ASSY - SPEAKER DRIVER	7001-0513	CUSHMAN	CE-50 FAMILY
	PRINTED CIRCUIT BOARD	1780-1036	CUSHMAN	
	CAPACITOR			
C 1	CAP-.47UF 10% 100V AXL MET-MYLAR	1008-0038	ELECTROCUBE	230B1B474K
C 2	CAP-1UF+75-10% 50V ELCTLT	1013-0004	SPRAGUE	30D105G050BA5
C 3	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 4	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 5	CAP-.02UF 20% 1KV Z5U CER DISC	1005-0040	ERIE	828-000-Z5U-[illegible]
C 6	CAP-1UF+75-10% 50V ELCTLT	1013-0004	SPRAGUE	30D105G050BA5
C 7	CAP-100UF +100-30% 16V RDL NP ELCTLT	1013-0029	MATSUSHITA	ECE-A16N100
C 8	CAP-250UF +75-10% 16V AXL ELCTLT	1013-0016	CORNELL DUBILIER	NLW250-16
C 9	CAP-250UF +75-10% 16V AXL ELCTLT	1013-0016	CORNELL DUBILIER	NLW250-16
C 10	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 11	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
Q 1	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 2	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 3	XSTR-2N2905 PNP SI TO 5 LOW PWR/SW	1272-0035	MOTOROLA	2N2905
Q 4	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 5	XSTR-TIP33A NPN SI X86 HIGH PWR/SW	1272-0084	TI	TIP33A
Q 6	XSTR-TIP34A PNP SI B19 HIGH PWR/SW	1272-0095	TI	TIP34A
	RESISTOR			
R 1	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 2	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 3	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 4	RES-2MEG 5% 1/4W CC	1066-2055	ALLEN BRADLEY	CB2055
R 5	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 6	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 7	RES-16.9K 1% 100PPM FILM	1075-0059	CAT.LIST	55-100
R 8	RES-24.3K 1% 100PPM FILM	1075-0097	CAT.LIST	55-100
R 9	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 10	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 11	RES-220 OHM 5% 1/4W CC	1066-2215	ALLEN BRADLEY	CB2215
R 12	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 13	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 14	RES-160 OHM 5% 1/4W CC	1066-1615	ALLEN BRADLEY	CB1615
R 15	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 16	RES-68 OHM 5% 1/4W CC	1066-6805	ALLEN BRADLEY	CB 6805
R 17	RES-68 OHM 5% 1/4W CC	1066-6805	ALLEN BRADLEY	CB 6805
R 18	RES-1 OHM 5% 1/2W CC	1067-0001	ALLEN BRADLEY	EB 0001
R 19	RES-1 OHM 5% 1/2W CC	1067-0001	ALLEN BRADLEY	EB 0001
R 20	RES-1 OHM 5% 3.25W 80PPM AXL WW	1159-0001	OHMITE	4330
R 21	RES-10K 1% 100PPM FILM	1075-0009	CAT.LIST	55-100
R 22	RES-68.1K 1% 100PPM FILM	1075-0136	DALE	MFF 1/8 TI
R 23	RES-100K 1% 100PPM FILM	1075-0105	CAT.LIST	55-100
R 24	RES-11K 1% 100PPM FILM	1074-0106	CAT.LIST	55-100
R 25	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
	INTEGRATED CIRCUIT			
U 1	IC-UA741CP	2025-0067	TI	UA741CP
U 2	IC-LM308N OP AMPL 8 PIN	2025-0070	NATIONAL	LM308N
U 3	IC-CLM6000 PHOTOCONDUCTOR	2025-0196		



NOTE.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-96. 93000 Speaker Driver.

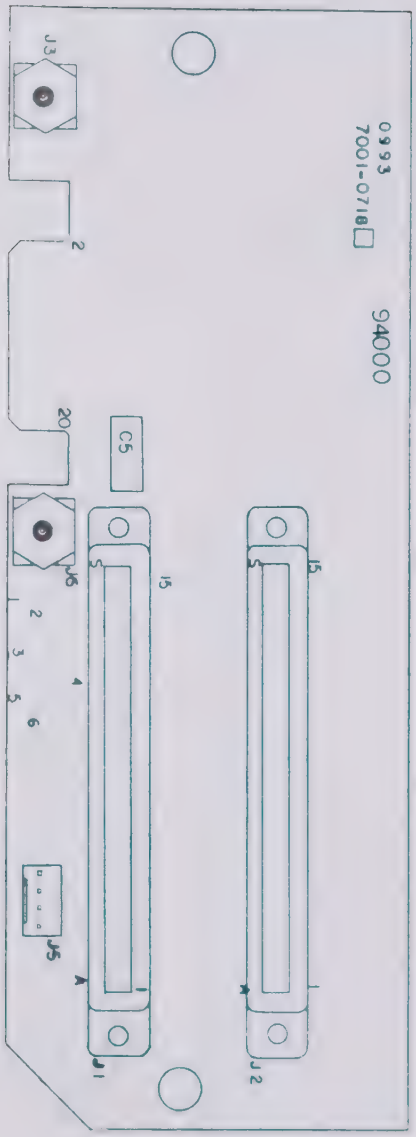
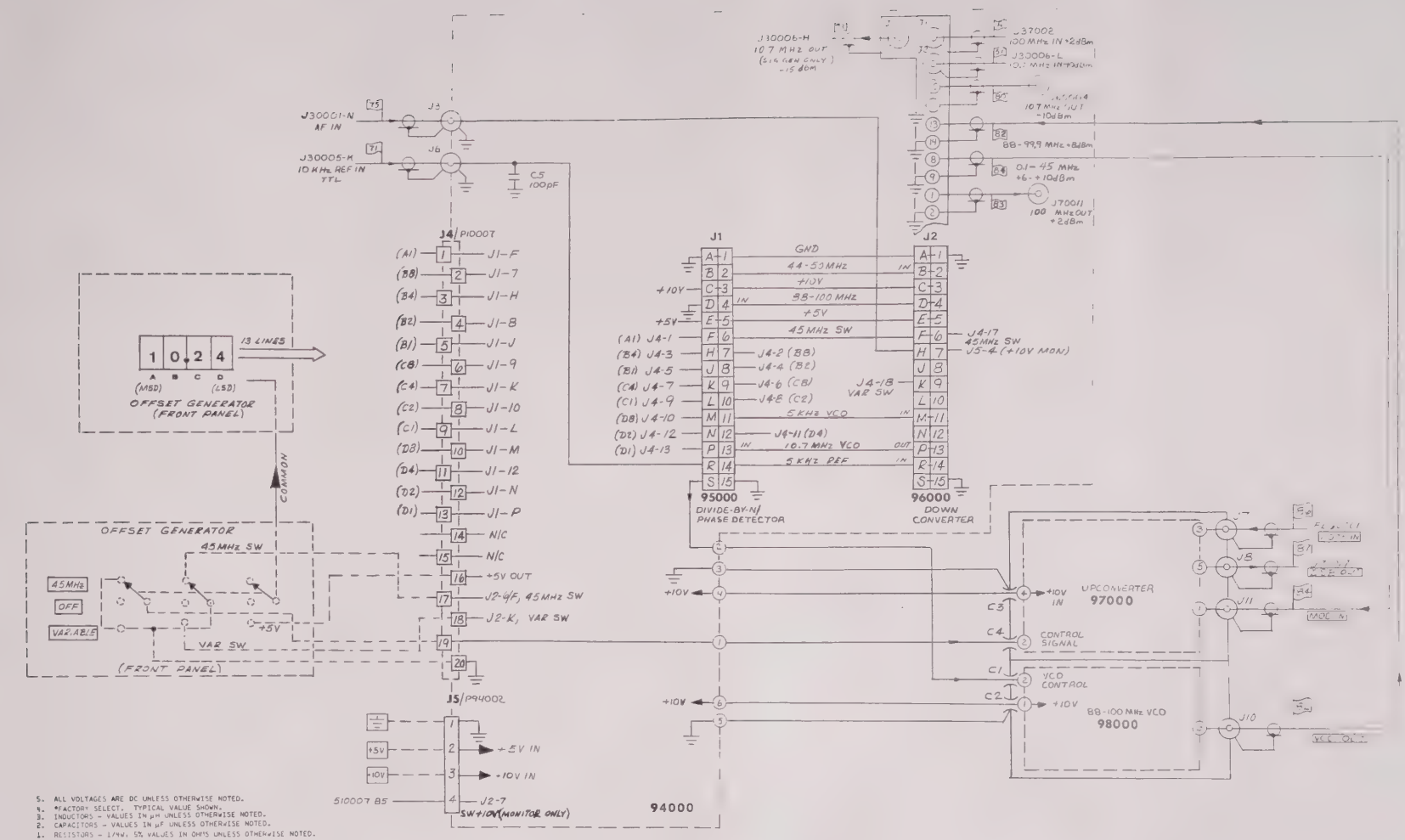


Figure 6-97 94000 Offset Generator Interconnect, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
94000	PCB ASSY - OFFSET GEN INTERCON	7001-0718	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0993	CUSHMAN	
	CAPACITOR			
C 94005	CAP-100PF 5% 500V DIP MICA	1002-0011	ELMENCO	DM15-F-101J
	CONNECTOR			
J 94001	CONN-30 CONT DBL ROW DIP TERM PCB JK	2535-0077	CONTINENTAL CONN.	K600-11-30YA
J 94002	CONN-30 CONT DBL ROW DIP TERM PCB JK	2535-0077	CONTINENTAL CONN.	K600-11-30YA
J 94003	CONN-SMB 50 OHM STR JK PC MT SNAP-ON	2536-0071	SEALECTRO	51-051-0000
J 94005	CONN-4PIN .1SP STR LKG PCB MT JK	2535-0144	MOLEX INC	22-27-2041
J 94006	CONN-SMB 50 OHM STR JK PC MT SNAP-ON	2536-0071	SEALECTRO	51-051-0000



NOTE:

5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-98. 94000 Offset Generator Interconnect.

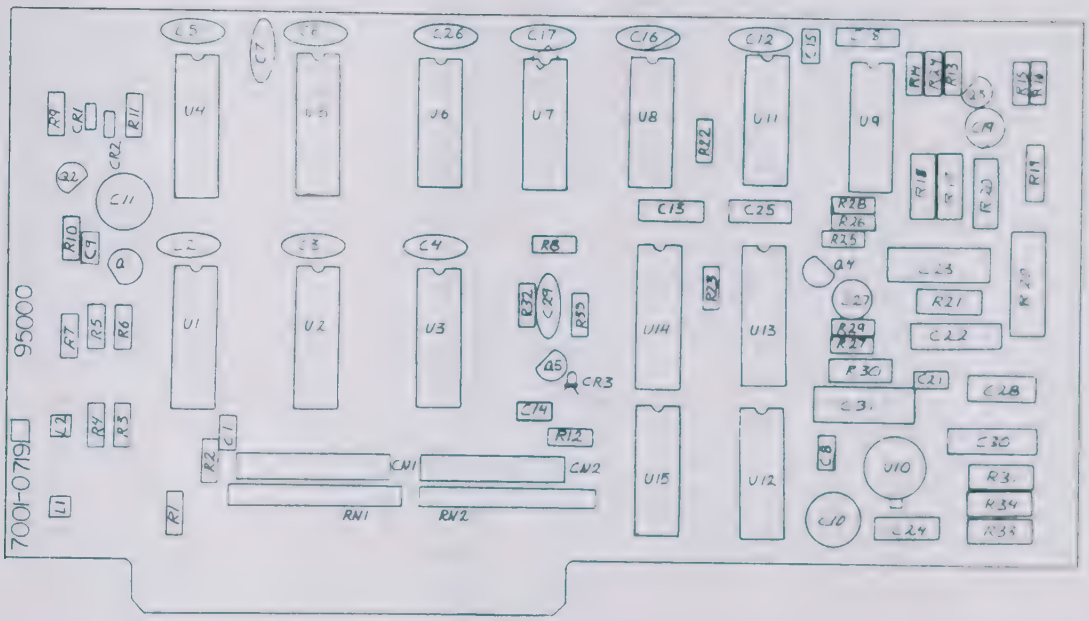
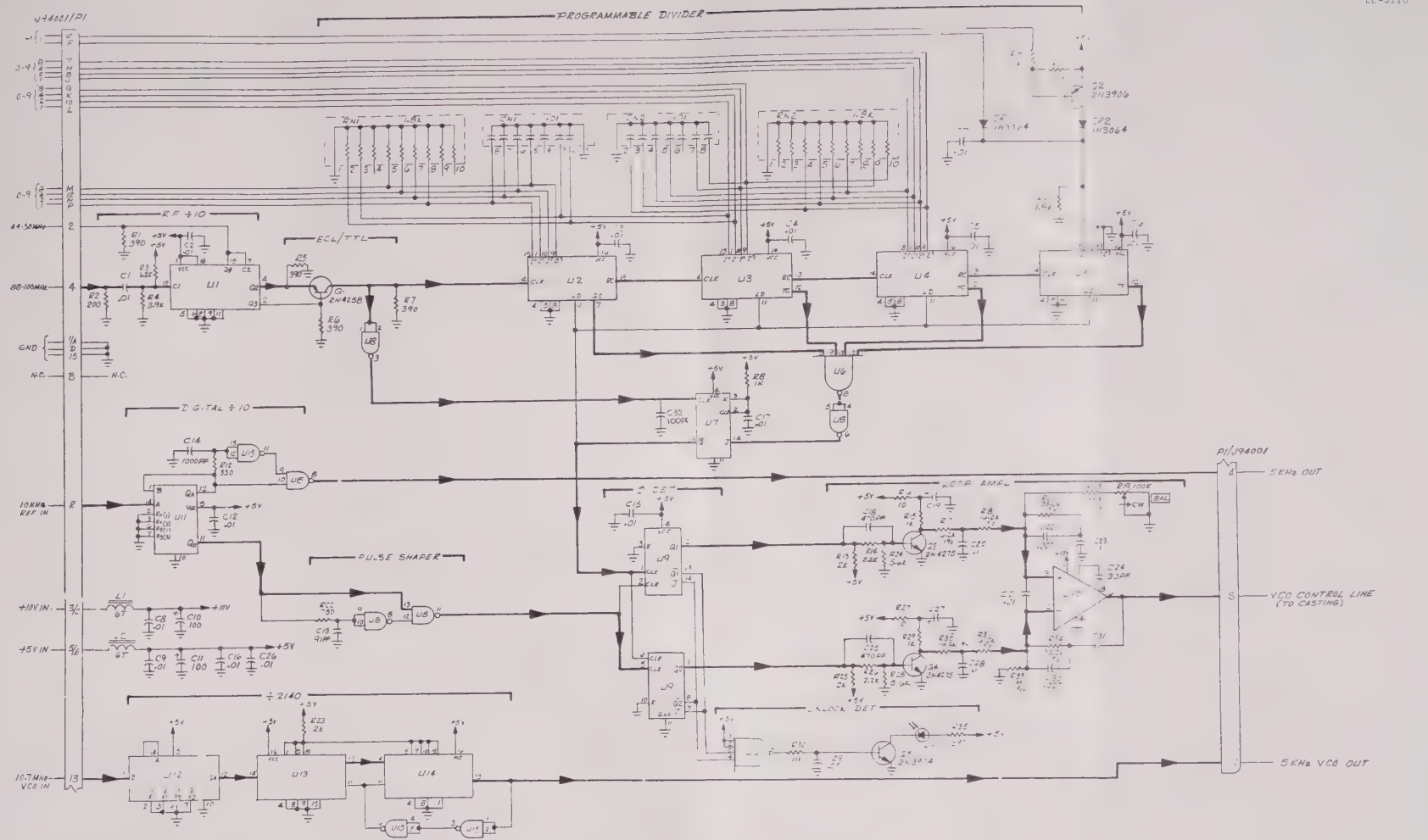


Figure 6-99. 95000 Divide-By-N/Phase Detector.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
95000	PCB ASSY - DIV-BY-N/PHASE DET	7001-0719	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0992	CUSHMAN	
	CAPACITOR			
C 1	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 2	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 3	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 4	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 5	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 6	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 7	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 8	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 11	CAP-100UF -10+75% 16V RDL ELCTLT	1013-0033	PANASONIC	ECEA1CV101S
C 12	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 13	CAP-91PF 5% 500V DIP MICA	1002-0027	ELMENCO	DM15-F-910J
C 14	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 15	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 16	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 17	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 18	CAP-470PF 1% 500V DIP MICA	1002-0044	CORNELL DUBILIER	CD15FD471F
C 19	CAP-1UF -10+50% 50V RDL ELCTLT	1013-0047	PANASONIC	ECEA1HV010S
C 20	CAP-.1UF 10% 100V RDL MET-POLYESTER	1008-0098	PLESSEY	60C104K100
C 21	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 22	CAP-.027UF 10% 100V RDL POLYESTER	1008-0032	SPRAGUE	225P27391WA3
C 23	CAP-1UF 5% 50V AXL POLYCARBONATE	1008-0081	ELECTROCUBE	625B1A105J
C 24	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 25	CAP-470PF 1% 500V DIP MICA	1002-0044	CORNELL DUBILIER	CD15FD471F
C 26	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 27	CAP-1UF -10+50% 50V RDL ELCTLT	1013-0047	PANASONIC	ECEA1HV010S
C 28	CAP-.1UF 10% 100V RDL MET-POLYESTER	1008-0098	PLESSEY	60C104K100
C 29	CAP-.05UF +80-20% 25V Y5U CER DISC	1005-0014	TUSONIX	5835-514-Y5U-503Z
C 30	CAP-.027UF 10% 100V RDL POLYESTER	1008-0032	SPRAGUE	225P27391WA3
C 31	CAP-1UF 5% 50V AXL POLYCARBONATE	1008-0081	ELECTROCUBE	625B1A105J
C 32	CAP-100PF 5% 100V NPO MINTR CER	1005-0082	TUSONIX	8121-100-C0G0-101J
CN 1	CAP-7/.01UF 20% 100VX7R 8 PIN SIP NTWK	1007-0001	SPRAGUE	460CH103XOPD
CN 2	CAP-7/.01UF 20% 100VX7R 8 PIN SIP NTWK	1007-0001	SPRAGUE	460CH103XOPD
	DIODE			
CR 1	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 2	DIO-1N3064 SI SW D07/D035 75PRV .25W	1281-0013	FAIRCHILD	1N3064
CR 3	DIO-LT EMIT RED 1.6V W ANG T1	1281-0137	HP	5082-4484
	INDUCTOR			
L 1	CH-3B FERRITE BEAD 30GA/6T	1586-0007		
L 2	CH-3B FERRITE BEAD 30GA/6T	1586-0007		
	TRANSISTOR			
Q 1	XSTR-2N4258 PNP SI R110 LOW PWR/SW	1272-0097	FAIRCHILD	2N4258
Q 2	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 3	XSTR-2N4275 NPN SI R110 LOW PWR/SW	1272-0016	FAIRCHILD	2N4275
Q 4	XSTR-2N4275 NPN SI R110 LOW PWR/SW	1272-0016	FAIRCHILD	2N4275
Q 5	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR	MFR NO.
	RESISTOR			
R 1	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 2	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 3	RES-1.2K 5% 1/4W CC	1066-1225	ALLEN BRADLEY	CB1225
R 4	RES-3.9K 5% 1/4W CC	1066-3925	ALLEN BRADLEY	CB 3925
R 5	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 6	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 7	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
R 8	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 9	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 9	POT-100K 10% 1/2W 25T CERMET TRMR	1215-0049	BOURNS	3299X1-104
R 10	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 11	RES-1.8K 5% 1/4W CC	1066-1825	ALLEN BRADLEY	CB1825
R 12	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 13	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 14	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 15	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 16	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 17	RES-16.2K 1% 100PPM FILM	1075-0057	CAT.LIST	55-100
R 18	RES-16.2K 1% 100PPM FILM	1075-0057	CAT.LIST	55-100
R 20	RES-931K 1% 1/2W 100PPM MF	1076-0004		
R 21	RES-33.2K 1% 100PPM FILM	1075-0098	CAT.LIST	55-100
R 22	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 23	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 24	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 25	RES-2K 5% 1/4W CC	1066-2025	ALLEN BRADLEY	CB2025
R 26	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 27	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 28	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 29	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 30	RES-16.2K 1% 100PPM FILM	1075-0057	CAT.LIST	55-100
R 31	RES-16.2K 1% 100PPM FILM	1075-0057	CAT.LIST	55-100
R 32	RES-11K 5% 1/4W CC	1066-1135	ALLEN BRADLEY	CB1135
R 33	RES-1 MEG .5% 100PPM FILM	1075-0180	SHELLY RODABAUGH	CMF55
R 34	RES-33.2K 1% 100PPM FILM	1075-0098	CAT.LIST	55-100
R 35	RES-390 OHM 5% 1/4W CC	1066-3915	ALLEN BRADLEY	CB 3915
RN 1	RNET-9/1.8K 2% 100PPM 10 PIN SIP	1115-0004	DALE	MSP10C01-182G
RN 2	RNET-9/1.8K 2% 100PPM 10 PIN SIP	1115-0004	DALE	MSP10C01-182G
	INTEGRATED CIRCUIT			
U 1	IC-10138 16PIN DIP BI-QUINARY CNTR	2025-0274	MOTOROLA	MC10138P
U 2	IC-74LS190 16 PIN DIP BCD UP/DOWN CNTR	2025-0263	TEXAS INSTRUMENTS	SN74LS190N
U 3	IC-74LS190 16 PIN DIP BCD UP/DOWN CNTR	2025-0263	TEXAS INSTRUMENTS	SN74LS190N
U 4	IC-74LS190 16 PIN DIP BCD UP/DOWN CNTR	2025-0263	TEXAS INSTRUMENTS	SN74LS190N
U 5	IC-74LS190 16 PIN DIP BCD UP/DOWN CNTR	2025-0263	TEXAS INSTRUMENTS	SN74LS190N
U 6	IC-74LS20 14 PIN DIP DUAL 4-INP NAND	2025-0216	NATIONAL	DM74LS20N
U 7	IC-SN74LS73N DUAL J-K FLIP FLOP	2025-0110	TI	SN74LS73N
U 8	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N
U 9	IC-SN74LS73N DUAL J-K FLIP FLOP	2025-0110	TI	SN74LS73N
U 10	IC-OP-08 8 PIN CAN OP AMPL	2025-0187	PRECISION MONOLITHIC	OP-0865
U 11	IC-SN74LS90N DECADE COUNTER	2025-0113	TI	SN74LS90N
U 12	IC-SN74LS90N DECADE COUNTER	2025-0113	TI	SN74LS90N
U 13	IC-SN74LS191N SYN UP/DOWN COUNTERS	2025-0115	TI	SN74LS191N
U 14	IC-SN74LS191N SYN UP/DOWN COUNTERS	2025-0115	TI	SN74LS191N
U 15	IC-SN74LS00N TTL NAND GATES	2025-0114	TI	SN74LS00N



NOTE:
1. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
2. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
5. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

Figure 6-100 95000 Divide-By-N/Phase Detector.

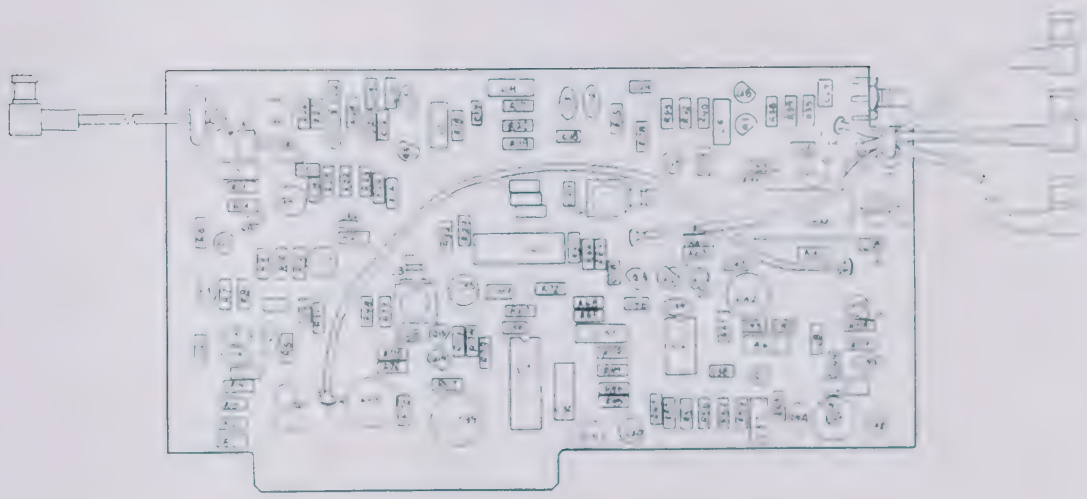


Figure 6-101. 96000 Down Converter, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
96000	PCB ASSY - DOWN CONVERTER	7001-0714	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0995	CUSHMAN	
	MIXER			
BM 1	MXR-SBL-1 DBL BAL 1-500MHZ	2010-0009	MINI-CIRCUITS LAB	SBL-1
	CAPACITOR			
C 1	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 2	CAP-82PF 5% 500V DIP MICA	1002-0020	ELMENCO	DM15-E-820J
C 3	CAP-120PF 5% 500V DIP MICA	1002-0010	ELMENCO	DM15-F-121J
C 4	CAP-200PF 5% 500V DIP MICA	1002-0042	ELMENCO	DM15-F-201J
C 5	CAP-82PF 5% 500V DIP MICA	1002-0020	ELMENCO	DM15-E-820J
C 6	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 7	CAP-10UF 20% 35V RDL ELCTLT	1013-0044	NICHICON	35UKB10M
C 8	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 9	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 10	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 11	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 12	CAP-100PF 2% 500V DIP MICA	1002-0050	ELMENCO	DM15-F-101G
C 13	CAP-300PF 5% 500V DIP MICA	1002-0059	ELMENCO	DM15-F-301J
C 14	CAP-470PF 10% 50V X7R MINTR CER	1005-0105	TUSONIX	8111-050-X7R-471K
C 15	CAP-300PF 5% 500V DIP MICA	1002-0059	ELMENCO	DM15-F-301J
C 16	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 17	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 18	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 19	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 20	CAP-6.8UF 10% 35V RDL TANT	1011-0002	DICKSON	D6R8GS1B35K
C 21	CAP-6.8UF 10% 35V RDL TANT	1011-0002	DICKSON	D6R8GS1B35K
C 22	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 23	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 24	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 25	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 26	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 27	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 28	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 29	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 30	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 31	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 32	CAP-22UF 10% 15V AXL TANT	1011-0003	SPRAGUE	150D226X9015B2
C 33	CAP-22UF 10% 15V AXL TANT	1011-0003	SPRAGUE	150D226X9015B2
C 34	CAP-30PF 5% 500V DIP MICA	1002-0043	ELMENCO	DM15-E-300J
C 35	CAP-10UF 20% 35V RDL ELCTLT	1013-0044	NICHICON	35UKB10M
C 36	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 37	CAP-470PF 1% 500V DIP MICA	1002-0044	CORNELL DUBILIER	CD15FD471F
C 38	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 39	CAP-100UF +100-30% 16V RDL NP ELCTLT	1013-0029	MATSUSHITA	ECE-A16N100
C 40	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 41	CAP-9-35PF 200V N650 V MT CER TRMR	1001-0006	ERIE	CV31D350
C 42	CAP-75PF 5% 500V DIP MICA	1002-0025	ELMENCO	DM15-E-750J
C 43	CAP-56PF 5% 500V DIP MICA	1002-0019	ELMENCO	DM15-E-560J
C 44	CAP-1000PF 10% 100V W5R MINTR CER	1005-0081	TUSONIX	8111-100-X7R0-102K
C 45	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 46	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 47	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 48	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 49	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 50	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR NO
C 51	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
	DIODE			
CR 1	DIO-1N5767 SI PIN A1AH	1281-0075	NIPPON ELECT	1SV34
CR 2	DIO-1N5767 SI PIN A1AH	1281-0075	NIPPON ELECT	1SV34
CR 3	DIO-MV104 SI DUAL VARICAP T092 40PF 32	1281-0058	MOTOROLA	MV104
CR 4	DIO-1N3064 SI SW D07/D035 75PR	1281-0013	FAIRCHILD	1N3064
	CONNECTOR			
J 1	CONN-SMB 50 OHM STR JK PC MT SNAP-ON	2536-0071	SEALECTRO	51-051-0000
J 2	CONN-SMB 50 OHM RTANG JK PC MT SNAP-ON	2536-0060	CABLEWAVE	700214NP
J 3	CONN-SMB 50 OHM RTANG JK PC MT SNAP-ON	2536-0060	CABLEWAVE	700214NP
	INDUCTOR			
L 1	CH-.18UH 10% RF MLD AXL .10DX.25L	1585-0074	DELEVAN	1025-02
L 2	CH-.18UH 10% RF MLD AXL .10DX.25L	1585-0074	DELEVAN	1025-02
L 3	CH-470UH 5% RF MLD AXL .19DX.44L	1585-0019	DELEVAN	2500-12
L 4	CH-.68UH 10% RF MLD AXL .16DX.38L	1585-0024	DELEVAN	1537-08
L 5	CH-.68UH 10% RF MLD AXL .16DX.38L	1585-0024	DELEVAN	1537-08
L 6	CH-1UH 10% RF MLD AXL .16DX.38L	1585-0027	DELEVAN	1537-12
L 7	CH-1.8UH 10% RF MLD AXL .16DX.38L	1585-0072	DELEVAN	1537-18
L 8	CH-100UH 10% RF MLD AXL .10DX.25L	1585-0054	DELEVAN	1025-68
L 9	CH-.047X.138X.118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
L 10	CH-.047X.138X.118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
L 11	CH-.047X.138X.118 FERRITE BEAD 4B	1586-0004	FERROXCUBE	56-590-65/4B
	TRANSISTOR			
Q 1	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 2	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 3	XSTR-2N5179 NPN SI T072 LOW PWR (MOTA	1272-0060	MOTOROLA	2N5179
Q 4	XSTR-2N5109 NPN SI TO39 HIGH PWR	1272-0110	MOTOROLA	2N5109
Q 5	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 6	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 7	XSTR-2N4392 SI T018 J-FET N-CHAN	1272-0054	TELEDYNE	2N4392
Q 8	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 9	XSTR-2N3563 NPN SI R110 LOW PWR	1272-0022	FAIRCHILD	2N3563
Q 10	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 11	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 12	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 13	XSTR-2N3906 PNP SI TO 92 LOW PWR/SW	1272-0037	MOTOROLA	2N3906
Q 14	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
Q 15	XSTR-2N3904 NPN SI TO 92 LOW PWR/SW	1272-0032	MOTOROLA	2N3904
	RESISTOR			
R 1	RES-15 OHM 5% 1/4W CC	1066-1505	ALLEN BRADLEY	CB1505
R 2	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 3	RES-68 OHM 5% 1/4W CC	1066-6805	ALLEN BRADLEY	CB 6805
R 4	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 5	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 6	RES-18 OHM 5% 1/4W CC	1066-1805	ALLEN BRADLEY	CB1805
R 7	RES-1.2K 5% 1/4W CC	1066-1225	ALLEN BRADLEY	CB1225
R 8	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 9	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 10	RES-18 OHM 5% 1/4W CC	1066-1805	ALLEN BRADLEY	CB1805
R 11	RES-18 OHM 5% 1/4W CC	1066-1805	ALLEN BRADLEY	CB1805
R 12	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO
R 13	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 14	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 15	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 16	RES-18 OHM 5% 1/4W CC	1066-1805	ALLEN BRADLEY	CB1805
R 17	RES-2.7K 5% 1/4W CC	1066-2725	ALLEN BRADLEY	CB2725
R 18	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 19	RES-18 OHM 5% 1/4W CC	1066-1805	ALLEN BRADLEY	CB1805
R 20	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 21	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 22	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 23	RES-10 OHM 5% 1/4W CC	1066-1005	ALLEN BRADLEY	CB1005
R 24	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 25	RES-180 OHM 5% 1/4W CC	1066-1815	ALLEN BRADLEY	CB1815
R 26	RES-100 OHM 5% 1/4W CC	1066-1015	ALLEN BRADLEY	CB1015
R 27	RES-3.3 OHM 5% 1/4W CC	1066-0006	ALLEN BRADLEY	CB33G5
R 28	RES-300 OHM 5% 1/4W CC	1066-3015	ALLEN BRADLEY	CB3015
R 29	RES-3.3K 5% 1/4W CC	1066-3325	ALLEN BRADLEY	CB3325
R 30	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 31	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 32	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 33	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 34	RES-1MEG 5% 1/4W CC	1066-1055	OHMITE	G.H. ONLY
R 35	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 36	RES-150 OHM 5% 1/4W CC	1066-1515	ALLEN BRADLEY	CB1515
R 37	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
R 38	RES-5.6K 5% 1/4W CC	1066-5625	ALLEN BRADLEY	CB 5625
R 39	RES-7.5K 5% 1/4W CC	1066-7525	ALLEN BRADLEY	CB 7525
R 40	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 41	RES-200 OHM 5% 1/4W CC	1066-2015	ALLEN BRADLEY	CB2015
R 42	RES-51 OHM 5% 1/4W CC	1066-5105	ALLEN BRADLEY	CB 5105
R 43	RES-330 OHM 5% 1/4W CC	1066-3315	ALLEN BRADLEY	CB3315
R 45	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 46	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 47	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 48	RES-18 OHM 5% 1/4W CC	1066-1805	ALLEN BRADLEY	CB1805
R 49	RES-13K 5% 1/4W CC	1066-1335	ALLEN BRADLEY	CB1335
R 50	RES-30K 5% 1/4W CC	1066-3035	ALLEN BRADLEY	CB3035
R 51	RES-13K 5% 1/4W CC	1066-1335	ALLEN BRADLEY	CB1335
R 52	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 53	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 54	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 55	POT-20K 20% 1/2W 1T CERMET TRMR	1215-0044	BECKMAN	91AR20K
R 56	RES-4.3K 5% 1/4W CC	1066-4325	ALLEN BRADLEY	CB 4325
R 57	RES-15K 5% 1/4W CC	1066-1535	ALLEN BRADLEY	CB1535
R 58	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 59	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 60	RES-18.2 OHM 1% 100PPM FILM	1075-0157	CAT. LIST	55-100
R 61	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 62	POT-1K 20% 1/2W 1T CERMET TRMR	1215-0058	BECKMAN	91AR1K
R 63	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 64	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 65	RES-1.2K 5% 1/4W CC	1066-1225	ALLEN BRADLEY	CB1225
R 66	RES-750 OHM 5% 1/4W CC	1066-7515	ALLEN BRADLEY	CB 7515
R 67	RES-909 OHM 1% 100PPM FILM	1074-1036	CAT. LIST	55-100
R 68	RES-180 OHM 5% 1/4W CC	1066-1815	ALLEN BRADLEY	CB1815
R 69	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
R 70	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR NO
R 71	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 72	RES-510 OHM 5% 1/4W CC	1066-5115	ALLEN BRADLEY	CB 5115
R 73	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 74	RES-4.7K 5% 1/4W CC	1066-4725	ALLEN BRADLEY	CB 4725
R 75	RES-10K 5% 1/4W CC	1066-1035	ALLEN BRADLEY	CB1035
R 76	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 77	RES-43 OHM 5% 1/4W CC	1066-4305	ALLEN BRADLEY	CB 4305
R 78	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025
R 79	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 80	RES-1K 1% 100 PPM FILM	1075-0037	CAT LIST	55-100
	TRANSFORMER			
T 1	XFMR-ASSY TOROIDAL BIFILAR	1579-0027		
	INTEGRATED CIRCUIT			
U 1	IC-CA 3046 XSTR AND D10 ARRAY	2025-0171	RCA	CA3046
U 2	IC-LM308N OP AMPL 8 PIN	2025-0070	NATIONAL	LM308N
U 3	IC-SN74LS73N DUAL J-K FLIP FLOP	2025-0110	TI	SN74LS73N

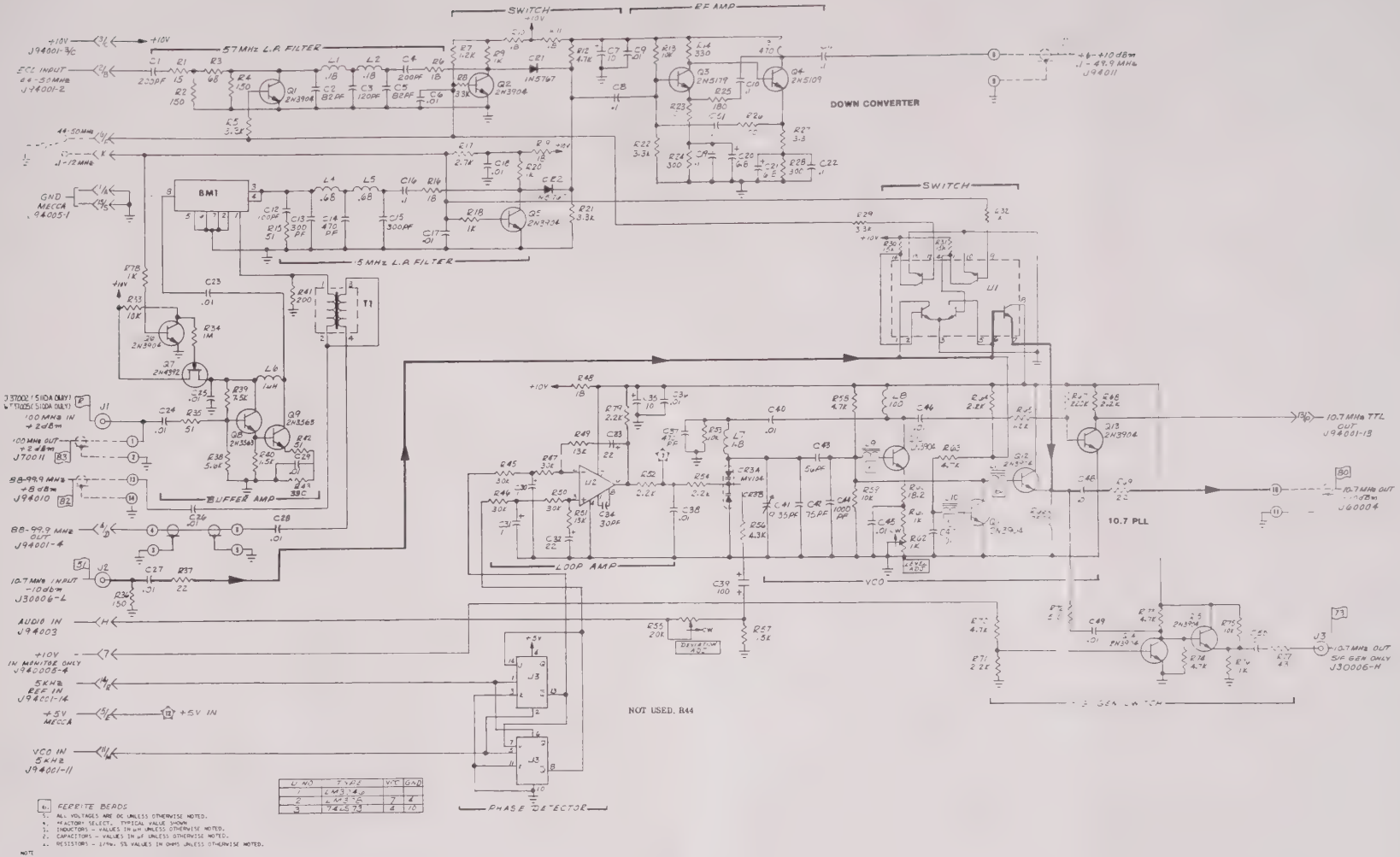


Figure 6-102. 96000 Down Converter.

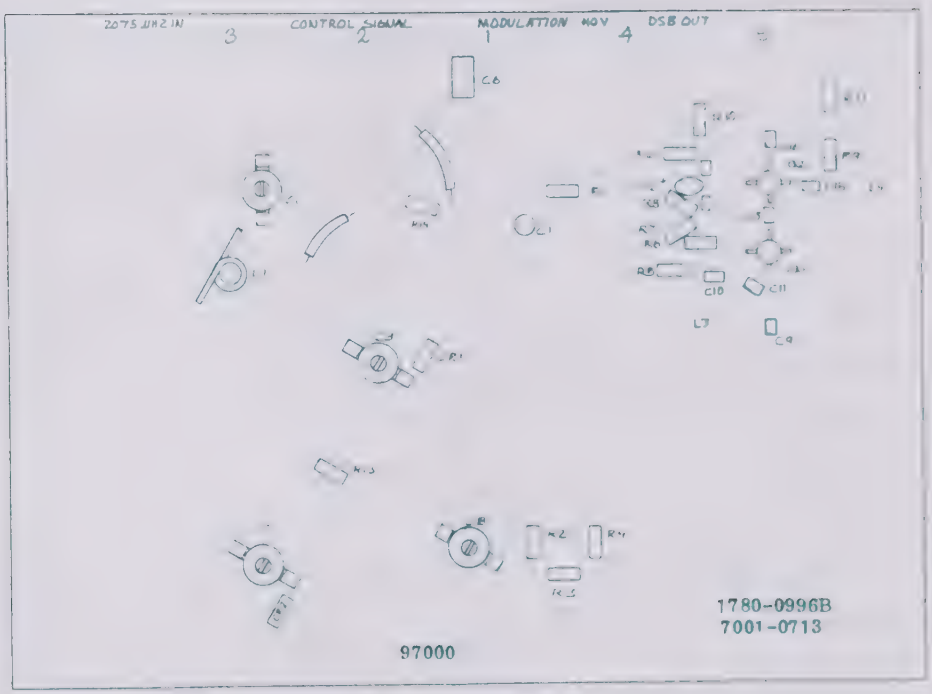
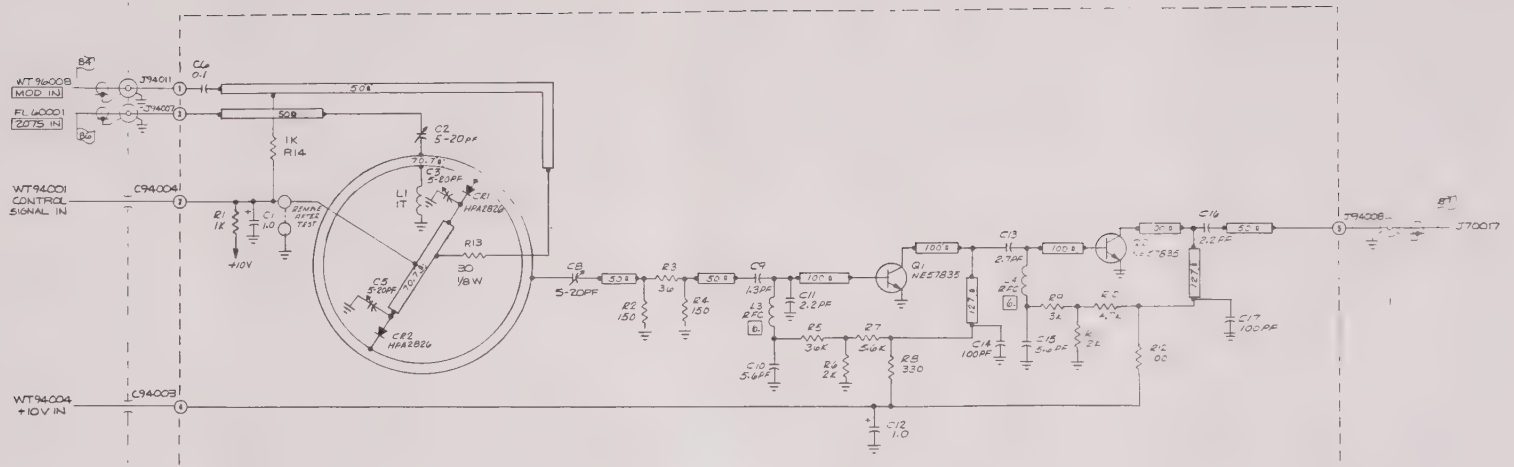


Figure 6-103. 97000 Up Converter, Component Location.

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
97000	PCB ASSY - UP CONVERTER	7001-0713	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0996	CUSHMAN	
	CAPACITOR			
C 1	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 2	CAP-5-20PF 25V NPO V ADJ CER TRMR	1001-0025	TUSONIX	513-012A 3.5-20PF
C 3	CAP-5-20PF 25V NPO V ADJ CER TRMR	1001-0025	TUSONIX	513-012A 3.5-20PF
C 4	CAP-5-20PF 25V NPO V ADJ CER TRMR	1001-0025	TUSONIX	513-012A 3.5-20PF
C 6	CAP-.1UF 20% 50V MINTR CER RED	1005-0097	ERIE	8121-050-651-104M
C 8	CAP-5-20PF 25V NPO V ADJ CER TRMR	1001-0025	TUSONIX	513-012A 3.5-20PF
C 9	CAP-1.3PF .25PF 50V NPO CHIP	1012-0034	JOHANSON	500 R16N143CB
C 10	CAP-5.6PF .5PF 50V NPO CHIP	1012-0011		
C 11	CAP-2.2PF .5PF 50V NPO CHIP	1012-0003	KEMET	C0805C229D5GHH
C 12	CAP-1UF 20% 50V RDL TANT	1011-0013	KEMET	T368A105M050AS
C 13	CAP-2.7PF .25PF 50V NPO CHIP	1012-0032	NOR CAL ASSOC	3BP050S2R7C S
C 14	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
C 15	CAP-5.6PF .5PF 50V NPO CHIP	1012-0011		
C 16	CAP-2.2PF .5PF 50V NPO CHIP	1012-0003	KEMET	C0805C229D5GHH
C 17	CAP-100PF 10% 50V NPO CHIP	1012-0004	NOVACAP	0805N101K500A
	DIODE			
CR 1	DIO-HP2826 HOT CARR 1.2PF AIN 15PRV BM	1283-0005	HP	5082-2826
CR 2	DIO-HP2826 HOT CARR 1.2PF AIN 15PRV BM	1283-0005	HP	5082-2826
	INDUCTOR			
L 1	ASSY-COIL-AIR CORE	1596-0068		
	TRANSISTOR			
Q 1	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
Q 2	XSTR-NE57835 NPN SI LOW PWR	1272-0086	NIPPON ELEC	NE57835
	RESISTOR			
R 1	RES-1K 5% 1/8W CC	1065-1025	ALLEN BRADLEY	BB1025
R 2	RES-150 OHM 5% 1/8W CC	1065-1515	ALLEN BRADLEY	BB1515
R 3	RES-36 OHM 5% 1/8W CC	1065-3605	ALLEN-BRADLEY	BB3605
R 4	RES-150 OHM 5% 1/8W CC	1065-1515	ALLEN BRADLEY	BB1515
R 5	RES-36K 5% 1/8W CC	1065-3635	ALLEN BRADLEY	BB3635
R 6	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2025
R 7	RES-5.6K 5% 1/8W CC	1065-5625	ALLEN BRADLEY	BB5625
R 8	RES-330 OHM 5% 1/8W CC	1065-3315	ALLEN BRADLEY	BB3315
R 9	RES-13K 5% 1/8W CC	1065-1335	ALLEN BRADLEY	BB1335
R 10	RES-4.7K 5% 1/8W CC	1065-4725	ALLEN BRADLEY	BB4725
R 11	RES-2K 5% 1/8W CC	1065-2025	ALLEN BRADLEY	BB2025
R 12	RES-100 OHM 5% 1/8W CC	1065-1015	ALLEN BRADLEY	BB1015
R 13	RES-30 OHM 5% 1/8W CC	1065-3005	ALLEN-BRADLEY	BB3005
R 14	RES-1K 5% 1/4W CC	1066-1025	ALLEN BRADLEY	CB1025



8. — Zo — IS MICROSTRIP TRANSMISSION LINE OF DESIGNATED CHARACTERISTIC IMPEDANCE
7. ALL CAPS ARE CHIP TYPE EXCEPT .01 UF AND 1 UF WHICH ARE RDM1 CERAMIC AND ELECTROLYTIC.
6. PRINTED ON PCB.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
3. INDUCTORS - VALUES IN uH UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN uF UNLESS OTHERWISE NOTED.
1. RESISTORS - 1/8W 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.

NOTE

Figure 6-104. 97000 Up Converter.

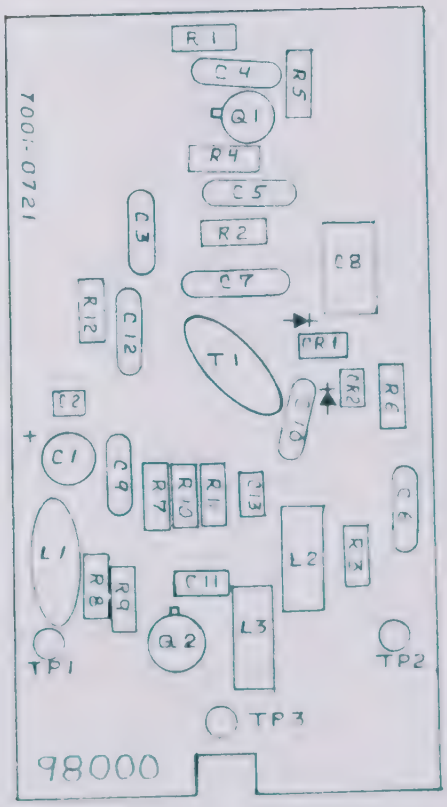
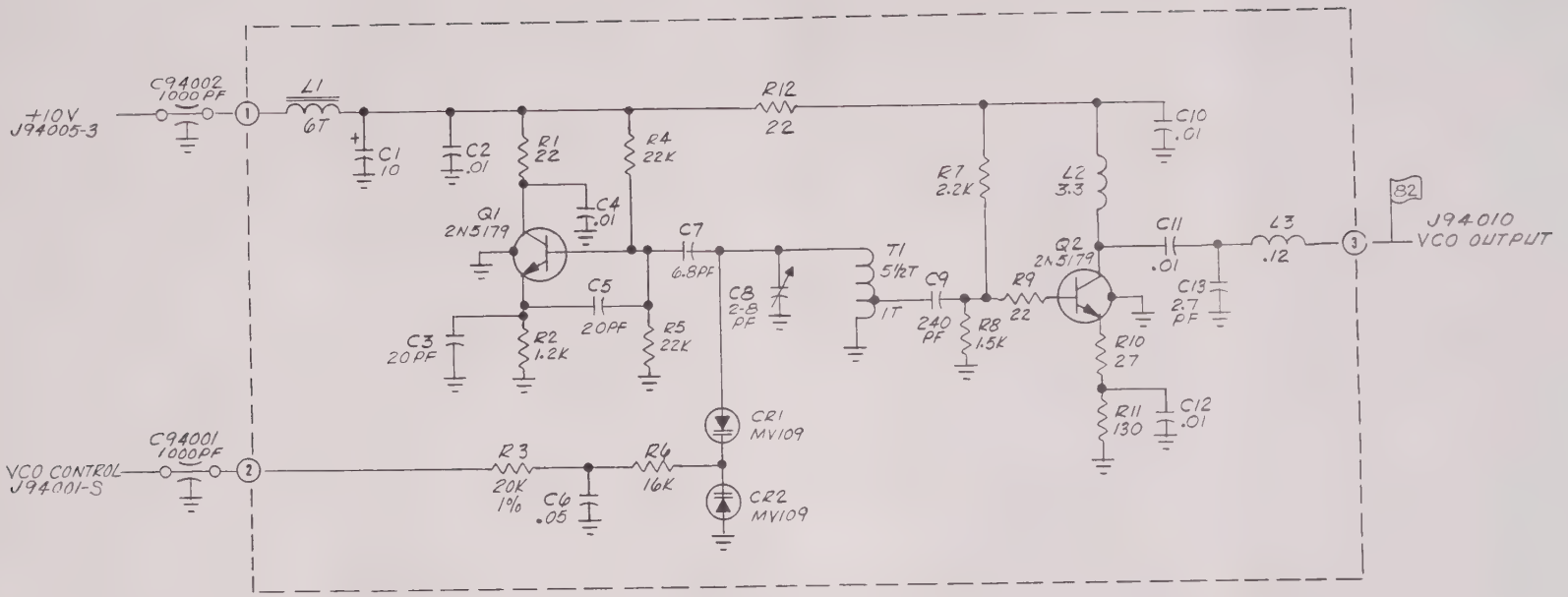


Figure 6-105. 98000 88-100 Mhz VCO, Component Location.

CKT REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
96000	PCB ASSY - 88/100 MHz VCO	7001-0712	CUSHMAN	5100 SERIES ONLY
	PRINTED CIRCUIT BOARD	1780-0997	CUSHMAN	
	CAPACITOR			
C 1	CAP-10UF +100-10% 25V RDL ELCTLT	1013-0035	ILLINOIS CAP.	10PC25
C 2	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 3	CAP-20PF 5% 500V DIP MICA	1002-0060	ELMENCO	DM15-E-200J
C 4	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 5	CAP-20PF 5% 500V DIP MICA	1002-0060	ELMENCO	DM15-E-200J
C 6	CAP-.05UF +80-20% 25V Y5U CER DISC	1005-0014	TUSONIX	5835-514-Y5U-503Z
C 7	CAP-6.8PF .25PF 500V NPO CER TUB	1005-0006	TUSONIX	301-000-C0H0-689C
C 8	CAP-2-8PF 350V NPO H MT CER TRMR	1001-0010	TUSONIX	538-006A (2-8)
C 9	CAP-240PF 5% 500V DIP MICA	1002-0030	ELMENCO	DM15-F-241J
C 10	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 11	CAP-.01UF 20% 100V Y5P MINTR CER WHT	1005-0100	ERIE	8121-100-651-103M
C 12	CAP-.01UF +80-20% 25V Y5U CER DISC	1005-0013	TUSONIX	5835-512-Y5U-103Z
C 13	CAP-2.7PF 10% 100V NPO MINTR CER	1005-0124	TUSONIX	8101-100-C0J0-279C
	DIODE			
CR 1	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
CR 2	DIO-MV109 SI VARICAP A276 29PF 30PRV	1281-0064	MOTOROLA	MV109
	CHOKE			
L 1	CH-3B FERRITE BEAD 30GA/6T	1586-0007		
L 2	CH-3.3UH 10% RF MLD AXL .16DX.38L	1585-0037	DELEVAN	1537-24
L 3	CH-.12UH 10% RF MLD AXL .10DX.25L	1585-0068	DELEVAN	1025-96

CKT. REF.	DESCRIPTION	CE STOCK NO	MFR.	MFR. NO
	TRANSISTOR			
Q 1	XSTR-2N5179 NPN SI TO72 LOW PWR	1272-0060	MOTOROLA	2N5179
Q 2	XSTR-2N5179 NPN SI TO72 LOW PWR	1272-0060	MOTOROLA	2N5179
	RESISTOR			
R 1	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
R 2	RES-1.2K 5% 1/4W CC	1066-1225	ALLEN BRADLEY	CB1225
R 3	RES-20K 1% 100PPM FILM	1075-0096	CAT.LIST	55-100
R 4	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 5	RES-22K 5% 1/4W CC	1066-2235	ALLEN BRADLEY	CB2235
R 6	RES-16K 5% 1/4W CC	1066-1635	ALLEN BRADLEY	CB1635
R 7	RES-2.2K 5% 1/4W CC	1066-2225	ALLEN BRADLEY	CB2225
R 8	RES-1.5K 5% 1/4W CC	1066-1525	ALLEN BRADLEY	CB1525
R 9	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
R 10	RES-27 OHM 5% 1/4W CC	1066-2705	ALLEN BRADLEY	CB2705
R 11	RES-130 OHM 5% 1/4W CC	1066-1315	ALLEN BRADLEY	CB1315
R 12	RES-22 OHM 5% 1/4W CC	1066-2205	ALLEN BRADLEY	CB2205
	TRANSFORMER			
T 1	COIL-NYL CORE 1/4-20/22GA 5.5T W/TAP	1596-0312		



NOTE:

1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.

Figure 6-106. 98000 88-100 MHz VCO.

APPENDIX

Sales and service information is available from:

Cushman Electronics, Inc.
Corporate Headquarters
2450 North First Street
San Jose, CA 95131
(408) 263-8100
TWX 910-338-0556

Regional Service Centers (U.S.A.)

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Midwestern
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Rolling Meadows, IL 60008
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1335 North Beltline Road
Suite 18A. Irving, TX 75061
(214) 256-1614

Southeastern
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3610 Interstate 85 N.E.
Atlanta, GA 30340
(404) 451-3264

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